Catching Feelings: Measurement of Theatre Audience Emotional Response Through Performance

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by

Ronald E. Evans

School of Humanities, Language and Global Studies

School of Psychology and Computer Science

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DEDICATION

To my Father, Ronald L. Evans, in loving memory.

DECLARATION

I declare that while registered as a candidate for the research degree, I have not been a registered candidate or enrolled student for another award of the University or other academic or professional institution.

I declare that that no material contained in the thesis has been used in any other submission for an academic award and is solely my own work.

Signed: Ronald E. Evans

Date: 28 December 2022

Ronald E. Evans

University of Central Lancashire

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ABSTRACT

Attendance at live theatre is declining. Although emotional experiences are a primary motivator for people to attend theatre, many leave disappointed, never to return. Catching feelings, therefore, is core to successful theatre business models. Yet, there is a surprising lack of research investigating audiences' emotional experiences while they are watching a play. This thesis explores the complex historical partnership between theatre and emotion, and suggests that measurement of physiological response using wearable biometric equipment is a viable tool for measuring audience emotional response during a performance.

Literature on measuring emotion in theatre is reviewed and categorized into four core areas. A framework for measuring physiological responses to theatre performances is proposed. A mixed-methods experiment measuring the physiological responses of nine audience members attending a production of Lauren Gunderson's play *I and You* at London's Hampstead Theatre is analysed and the playwright is interviewed on her expectations of the audiences' emotional response. The findings indicate that participant physiological arousal significantly increased at the surprise climax of the play as compared to two other sections of the play. Participants reported feeling, similarly, emotions of surprise and sadness. This suggests that audience emotional responses correlate to plot points with expected emotional response. Additionally, the use of measurement equipment is well tolerated during a performance. Based on this, a new model for rating the impact and capacity needs of emotional engagement activities is suggested, providing a novel tool for theatre companies to influence the behaviour of new and returning attendees, generate additional revenue, and connect audiences and theatrical experiences in enhanced, emotionally meaningful ways.

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INTRODUCTION

> "Unless we tell stories about ourselves, which is all that theater is, we're in deep trouble. It's an age-old human need. The lights go down, our thumbs go in our mouths, and someone says, 'Once upon a time.' And we believe it." -*Alan Rickman*

It was a truly awful play. Bad acting. A laughable script. As the first act was ending, I considered exiting, undetected at the interval. And then I heard a quiet sob from the stranger sitting next to me, who was, it seemed, deeply engrossed and emotionally moved by the performance. A tear was streaming down his face. I was dumbfounded. And fascinated. Why was he having such an emotional reaction to the same play that I thought was terrible?

This thesis sets out to explore that experience, to assess how and why such widely diverse emotional experiences could be felt by audience members at one performance. Motivated by personal curiosity and supported by my career experience working as a consultant to theatre companies in both the U.S. and the U.K., my thesis is also formatively valuable to professionals in performance, offering an expansion the theatre sector's knowledge of how audiences react emotionally to theatrical experiences at a time when plays and musicals need new strategies to survive.

Attendance at live theatre was already declining: in the 10 years between 2002 and 2012 attendance suffered a 33% reduction (Cohen) and the COVID-19 pandemic has caused theatre companies to additionally lose more than £1.04 billion in turnover (Watling). The theatre sector not only needs theatre lovers to return, but additionally must entice new audiences to venture into

both traditional and virtual venues if theatre is to thrive. My research suggests that audiences are interested in exploring, augmenting, and reflecting on the emotional experiences they have during performance, that measuring these emotional responses is possible for theatre companies of any capacity, and that theatre companies that focus on helping audiences to achieve this goal stand to reap the rewards in increased attendance, relevance, and revenue.

As I will show, the definition of emotion has been an ongoing subject of debate over many centuries. I align with Kleinginna and Kleinginna's working definition:

> Emotion is a complex set of interactions among subjective and objective factors, mediated by neural/hormonal systems, which can (a) give rise to affective experiences such as feelings of arousal, pleasure/displeasure; (b) generate cognitive processes such as emotionally relevant perceptual effects, appraisals, labelling processes; (c) activate widespread physiological adjustments to the grounding conditions, and (d) lead to behaviour that is often, but not always, expressive, goal-directed, and adaptive (355).

Kleinginna and Kleinginna capture factors that make emotion an integral part of theatrical performance: that audiences respond physiologically to emotions, that experiencing these strong emotions may lead to changes in opinion and future behaviours, and that emotions can lead to pleasurable affective experiences. And theatre audiences seek out these emotional experiences. Audiences attaining "a heightened emotional state" is a motivator for attending theatre (Gilbride and Orzechowicz) and my research has illuminated that those emotional experiences are many and varied. Audiences may engage emotionally through empathy with characters or exploration of new situations, sharing of a special experience with friends and family, or revisiting a cherished emotional experience from childhood. These emotional experiences, attained through theatre, can and do change personal opinions and shape future

behaviours (23), and historically, we have seen theatre imbricating with and also governing society and social structures, as I will discuss.

Audience members are infrequently consulted about their emotional experience in the theatre at the time of a performance. When they are, the most common method used to date has been a post-performance email requesting a "sum up" of their overall emotional impression, rating their feelings on a pre-determined Likert scale. Such a system can skew research: audience members may report on the most intense feeling they remember, or perhaps the most recent. But this methodology prevents us from knowing vital answers to questions such as: Did their feelings change from the start of the performance to the end? What emotions did they feel at a specific point in the play? What were they feeling all along the way?

Despite the clear importance of emotion to both the sustainability of theatre as an art form, and the subjective experience of each individual audience member, there remains a paucity of evidence on how these emotional reactions to theatre performances are created, manipulated, and regulated while the audience member is actually sitting in their seat. And yet, with new access to emotional measurement tools formally only available in a laboratory setting, the conditions have never been better for theatre companies to focus on creating and measuring intense emotional experiences.

Therefore, the aim of this interdisciplinary thesis is to provide theatre leaders with tangible strategies to reverse the decline of theatre attendance by prioritizing the emotional engagement of their audiences.

To achieve this aim, in the next chapter I explain how emotion has been used in theatre as leverage to effectively influence political agendas and change societal behaviour, setting the stage for emotion to be used now to increase empathy in society. In Chapter 2, I examine the

value of theatre rituals, and the emotional dynamics of experiencing theatre as a group, and present evidence that emotional engagement is a path to new revenue for both traditional and digital experiences. Chapter 3 introduces physiological response as a measurement of emotion, and explores the potential for its use in a theatre context. In Chapter 4, I review the shortage of literature on the measurement of theatre audience physiological response, and argue that every theatre company, no matter their capacity, can conduct experiments with their audiences. As proof, Chapter 5 reports on the results of my study to explore the physiological response of nine audience members to the U.K. premiere of American playwright Lauren Gunderson's play *I and You,* in partnership with London's Hampstead Theatre, where Lauren Gunderson was present and agreed to be interviewed about her expectations on the emotional response of audience members and her approach to writing for emotional response (see Appendix 1 for the full interview). In Chapter 6, I explore possible explanations for these findings, and offer strategic advice to theatre professionals on how the results may be immediately utilized to form new attendance and engagement strategies. In Chapter 7, my conclusion explains how these new findings both inform and are informed by the rich history of emotion and theatre, and suggests avenues for continued exploration.

Ultimately, my research seeks to address the following questions:

- Q1: Do audiences experience increased emotional response during a specific plot where the playwright expects an increased response?
- Q2: Is physiological measurement a viable method for understanding the emotions of theatre audiences?
- Q3: Are the potential benefits of prioritizing and expanding the emotional engagement of audiences worth the investment of capacity by theatre companies?

The insights gained from this study will hopefully be of assistance to academics, artistic directors, and anyone else who feels as I do: that life becomes more vibrant, magical, and meaningful when the lights go down and the curtain goes up.

1: Theatre And Emotion As Leverage

"Theatre is the most perfect artistic form of coercion."
-Augusto Boal

While attending a theatre performance today is generally free from risk to life and limb, it has not always been so. In this chapter, I will show the inseparable relationship between emotion and theatre, and describe how, throughout history, emotional theatre experiences have been used as tools to manipulate and influence behaviour, exercise political control, inscribe a form of social cohesion, and promote revolutionary or radical platforms. To accomplish this aim, I explore the connections between transatlantic theatre and audience emotion, classifying five ways emotion has been harnessed by authorities to influence audience members in pursuit of political agendas from historical examples. For the audience, I explore ways that emotional response is seen an integral part of theatre experience, and show the importance of emotion to the audience member's evaluation of the theatre experience.

To Control and/or Challenge Conventions of Public Behaviour

Theatre audiences today often attend a performance to be entertained. However, the history of transatlantic theatre illustrates that theatre has often been used to influence spectators

to achieve other ends. My thesis limits its survey to types of theatricalities that we now associate with urban centres and mainstream stages, though I recognize that theatricality is myriad in structure and operation, and its outcomes cannot be contained within one definitive statement. I should also note that while there are clear differences between how U.S. and U.K. theatres operate, such as substantially greater public funding for U.K. theatre companies as compared to the U.S. (McCaughey) the experience of the audience shows many similarities. Theatre has benefited from a long history of practitioners crossing over the Atlantic. Saxon notes that "professional companies that travelled across the colonies in the eighteenth century came almost exclusively from London" (7). Best practices established in one country are often implemented in the other (such as the evolution of Broadway in the U.S. and the West End in the U.K.). In an interview for this project, playwright Lauren Gunderson shared that she does not see any significant difference in audiences between the U.S. and the U.K. (See Appendix 1, pg. 197). In both countries, theatre enables gathering for a social experience, rooted in emotional expressiveness. As I will show, practitioners and writers involved with stage production in both countries have repeatedly encouraged audiences to explore and experience a range of powerful emotions.

To be clear, the history of theatre and emotion predates the formal existence of either country. I take, as my starting point, therefore, the model of ancient Greek theatre tradition, which most profoundly and deliberately elicited emotional experiences, employing a "chorus" who "acted as models in expressing emotions that the playwright aims to elicit from the audience." (Woodruff 146). Ancient Greek theatre was embedded in the body politic and used as a tool to control and influence societal behaviour, reminding people of their place using emotion as a motivator. Discussing Aristotle's *Poetics,* Karapetian states, "viewers leave the theater ready

to uphold society's norms. Society's gatekeepers need this process to keep disaffection with inequity at bay" (20). Aristotle analysed emotional goals of theatre in *Poetics*, describing the theatrical experience in terms of stories that evoke "pity and fear", explaining audience catharsis as they identify with the emotions of the characters being portrayed onstage. Through this emotional experience, audience members left the play with a sense of social belonging and cohesion (Woodruff 147), though we should note that such apparent emotional harmony was set within proscribed hierarchically established boundaries. While we don't fully comprehend the effect of theatre attendance/catharsis on audience members subsequent to the event, we can speculate that stories that focused on horrific events that unfold in early Greek tragedy influenced behaviour and expectation.

This tradition of Aristotelean catharsis was repeated/adopted/adapted in the works of subsequent theatre practitioners. In late sixteenth-century England, Shakespeare created stories, cyclically distinct (the influence of Christianity), and theatrically innovative (placing violence centre-stage) but with like purport to influence audience emotional states. Marshall describes the tense moment in *King Lear* when Gloucester's eyes are put out: "the audience member 'who covers his eyes in horror enacts the blindness that Cornwall creates'" (54) … "the mimetic act of self-blinding creating empathetic emotion that 'was felt as pleasurably cathartic' by audiences" (56). While I do not fully concur with Marshall's assessment, it is clear that in Renaissance theatre, emotional states were likewise elicited from audiences, with a similar goal of social cohesion and binding to inscribed behavioural norms.

Aristotle's work on catharsis has influenced a range of critical interpretations. Keesey provides an excellent summary: "History has oscillated between readings which claim that tragedy somehow brings about a 'purification' of the audience's emotions of pity and fear or

other similar emotions, and readings which claim that tragedy 'purges' such emotions" (193). According to Keesey, prior to the late seventeenth century, tragedy was the formulation through which unacceptably "excessive" emotion was "purged", however by the 1700s, emotion came to be seen as a symbol of sensibility, and therefore connoted more positive value. Language at this pointed shifted from 'purged' to "purified." As I will explain, these social and cultural shifts in definitions of emotion coincided with major changes in the theatre, from a brightly lit social place to meet and greet, to a quiet venue capable of exploring more complex stories and emotional experiences.

Other important critics have commented that the intense emotional experiences and catharsis of Greek tragedy are significant for studies of their own social structures. In "The Theatre and Its Double", Antonin Artaud describes his search for a "theatricality capable of reintroducing on the stage a little breath of that great metaphysical fear which is at the root of all ancient theatre" (44). Artaud argued that western societies had confused "art" and "aestheticism," and in the process lost contact with what he refers to as a "pure" theatre. Non-western societies, searching for ways to explain complex phenomena told stories that reminded audience members that they were a small part of a much larger universe and one that was inexplicable and as well intrinsic. What Artaud promoted was a form of theatricality that embraced the emotional complexity of that "great metaphysical fear" associated with art, rather than artifice: theatre to reconnect to deep-rooted instinctual human emotions.

Gilbert agreed, exploring in Aristotelian catharsis, that:

> The fall of an evil man may arouse human sympathy, but neither pity nor fear. In fact, the Aristotelian pity or fear can be felt only with respect to a man like ourselves, not pre-eminently good, and not a monster of iniquity, but yet one whose misfortune is the result of some error of his own (309).

Gilbert here articulates the difference between sympathy (the ability to feel sorrow for the misfortune of others at an emotional distance) and empathy (the ability to share the feelings of others and see things from their perspective. Gilbert suggests that we can see ourselves in archetype characters and learn lessons we can apply to our own life, and very specifically, we do not relate in that emotional sense, to extreme characters.

However, this ability to connect on a deeply emotional level with characters onstage has also been used to suppress challenges to social behaviour and norms. Augusto Boal considered empathy to be a central concept of catharsis, describing it as:

> The emotional relationship which is established between the character and spectator, and which provokes, fundamentally, a delegation of power on the part of the spectator, who becomes an object in relation to the character: whatever happens to the latter, happens vicariously to the spectator (Boal 102).

Boal warns us that Aristotle's "formula" of catharsis is a "coercive system of tragedy". Spectators, emotionally and empathetically connected to the characters onstage, are encouraged to recognize their personal hamartia, or tragic flaw. This hamartia must then be purified through witnessing the character onstage suffer the consequences of their own non-conformist actions, which have disrupted the incumbent body politic. To Boal, the Aristotelian concept of tragedy, focused on emotional release, is controlling and authoritarian. This "oppressive theatre" seeks to influence/coerce the behaviour of the spectator, to cure what the local site of power considers to be an "antisocial characteristic" (40). Thus, the authorities circumscribe a form of theatre as "a very powerful purgative system, the objective of which is the elimination of all that is not commonly accepted, including the revolution, before it takes place" (47).

Importantly, Boal felt that theatre had evolved to artificially separate the actor from the audience. He called for a reversal of this trend and suggested that audience members benefited most when *everyone* was an actor. To this end, Boal's "forum theatre" invites audience members to participate in revisions of performances, arguing, "any participant in the audience has the right to replace any actor and lead the action in the direction that seems to him the most appropriate" (139). The audience member -- now actor -- revises the plot and character, improvising in accordance with the adapted scenario. Boal suggested that forum theatre not only allows people to explore possible solutions through the power of storytelling, but that the process helps people to gain perspective on how revolution could be formulated and then enacted: "often a person is very revolutionary when in a public forum… on the other hand, he often realized that things are not so easy when he himself has to practice what he suggests" (139). Boal's forum theatre is a model of applied theatre, with the goal of bringing audience members into an active state of participation and self-reflection. Central to the applied theatre form is the idea of praxis: in this context, a confluence of theory and practice that creates the ability to reflect critically on one's actions in order to change the circumstances in which one is living" (29) and to "help participants act, reflect, and transform" (30). Thus, it is involvement at an emotional level, for Boal, as for Artaud, that is central to theatrical experience.

Artaud and Boal's paradigms highlight theatre's potential to inculcate audience members in a deep exploration of emotional topics, question their personal opinions, understand empathy, and potentially transform their own behaviour. While Greek tragedy harnessed emotions, it did so in order to produce social cohesion, whereas for Artaud and Boal, theatre's possibility was revolutionary. Nevertheless, the modes discussed above establish that harnessing, containing,

and manipulating audience emotional response was crucial whether to maintain or challenge social order.

Bertolt Brecht brought a different perspective. He argued that audiences were growing less emotionally involved over time. Brecht felt that theatre should wake audience members to reason, so that they might better understand their place and impact in the world:

> True, their eyes are open, but they stare rather than see, just as they listen rather than hear. They look at the stage as if in a trance — an expression which forms from the Middle Ages, the days of witches and priests. […] this detached state, where they seem to give over to vague but profound sensations, grows deeper the better the work of the actors. (Willet).

Thus, Brecht's "Epic Theatre" style sought to distance actors and audiences from each other. He felt that audience members who were too emotionally involved with a play lost the ability to think rationally and became unable to consider the political message of Brecht's theatre. He introduced the technique of "Verfremdungseffekt" to alienate the audience into effecting social exchange ("Epic Theatre Using Verfremdungseffekt"). Brecht (as cited in Boal) warned against "emotional orgies" in which the audience member becomes a victim of the character through emotional attachment, abiding by the character's decisions and undermining their own ability to rationalize the ideas generated by the character (Boal 103). Brecht is suggesting that audience members must keep a part of themselves separate from their emotions, as observers. This separation allows for the rational consideration of the arc of the characters and the storyline, and to observe one's own emotions. Interestingly, this concept of observing one's emotional state is now known to be a core aspect of mindfulness meditation, used as a tool to explore and regulate one's emotional response (Linder). Brecht and Boal both considered empathy to be an important part of the theatre experience, but also expressed that audience

members should maintain conscious emotional distance from both plot and character. The focus should instead be on the cause of the character's plight, and the promotion of radical social upheaval.

To Define and Maintain Elitism and Social Status

For contemporary critics, the Aristotelian concept of catharsis can be located as reductive in its focus on a limited range of emotion – pity and fear – at the expense of the vast range of emotions that theatre elicits from audience members. Yet, it is important to note that the modern theatre experience has its roots in earlier forms that included such focus on catharsis, and may express themselves in innovative ways, especially as experimentation in immersive theatre continues to change the expectations of traditional theatre audiences.

As emotional range in theatre has shifted, access to theatre has also expanded, across a range of diverse identity markers. In England, the passing of the Theatre Regulation Act in 1843 abolished the monopoly held by a small number of government-licensed theatres, opening the door for the creation and experimentation of new theatres for profit. In response to the rising demand for entertainment by British middle and working classes with leisure money and new options to easily travel between rural and urban areas by train, theatre venues and music halls did brisk business. In his survey of theatre in the nineteenth century, Michael Booth states that it is "not possible to comprehend that theatre and audience without some comprehension of what was happening economically, socially, and culturally outside the theatre" (2). As an example, the population of London had increased from 900,000 in 1801 to 3,000,000 in 1851, with 79% of the

people being in the working class, as families moved from rural to urban living (Booth 4). This population boom created an exponentially lucrative new potential audience for theatre.

Leading up to this time, acceptable social behaviour while attending a play was different to how audiences behave in contemporary mainstream auditoria. Such a shift in audience demographic led some elitist commentators to align rowdy audience behaviours with class-based prejudice. For example, German Prince Pückler-Muskau, disgusted by the behaviour of the gallery spectators at the King's Theatre, stated "the interest was generally so slight, the noise and mischief so incessant," that it puzzled him to understand how actors could form themselves before, "so brutal, indifferent, and ignorant of an audience," who "interrupted the singers with shouts and tossed orange peel and other food substances onto the heads of the pit" (qtd in Booth 9). Impatient audiences at Queen's Hall in 1894 behaved similarly. Bernard Shaw (qtd. in McParland) said:

> I do not object to a cheer that has the unmistakable depth and solidity of tone that come only from a genuine ebullition of enthusiasm, but this under-bred, heartless, incontinent, wide-mouthed, slack-fibred, brainless bawling is wearisome and disgusting beyond endurance.

As easy as it might be, we cannot apply our modern behavioural expectations to these cases. Audience behaviour in the seventeenth century dictated that attending the performing arts was a social function, to see and be seen by others. In his work "Listening in Paris," Johnson argues that:" […] attending the opera was more social event than aesthetic encounter […] little more than an agreeable ornament to the magnificent spectacle, in which they themselves played the principal part" (10). The intensity of this attitude makes the monumental change that was about to happen even more significant.

But by the end of the 19th century, audiences fell silent. The riotous theatre experience of audiences separated by pit, boxes, and gallery transformed into a more passive, quieter form of participation, similar to what we experience in the audience of contemporary mainstream theatre. This change was influenced by variety of factors. Mandated working hours offered the working class more freedom for leisure activities. The rise of the popularity of music halls also contributed to the exodus from theatre venues. Music hall audiences could smoke, drink alcohol, and socialize and these became so popular, that by 1892, music halls outnumbered theatres by a factor of ten (Booth 11).

As those seeking fun, frolics, and flowing refreshment decided to shift their allegiances, those driven more by the concept of theatre as social improvement sat back and listened. According to Lee, such a change was class-based:

> And as opera houses became the preserve of the upper and middle classes, so their audiences attempted to distance themselves consciously from the noisy and often crude behaviour that was increasingly associated with music halls. Silence, in other words, became what it had never been in the past – a mark of social distinction, of taste and of refinement (Lee).

Clearly, it is too simplistic to align social behaviour with class in this way. On the one hand, attendance at music halls was never as class bound as it became at opera. On the other, the performance of Opera (which would become closely associated with mainstream theatre by the late nineteenth century) had been popular across all groups early in the century. American Consul George Makepeace Towle noted that: "*Lucretia Borgia*, *Faust*, *The Barber of Seville* and *Don Giovanni* are everywhere popular; you may hear their airs in the drawing room and concert halls, as well as whistled by the street boys and ground out on the hand organs" (Towle).

So, we can be sure that factors other than class preference were at play. Ticket pricing structures, venue policies, and expensive dress codes promoted an elites-only audience. Many such exclusionary tactics continue to be suggested as barriers to attendance to modern theatre performances. We can see a challenge to that elitism in contemporary works, such as the Arts Marketing Association's report, "Not For The Likes Of You" (2004), which attempts to positively influence theatre company communication best practices to improve messaging to reach a broad audience (Morton et al.).

Physical changes to the venue in the nineteenth century also influenced audience behaviour. The proscenium arch was introduced, separating audiences from actors. With the introduction of gas lighting in 1817, and limelight in 1837, audiences who had been as "brightly lit as the stage" slipped into darkness, forcing the attention on the now well-lit performers (Jacobson and Blair). Erin Hurley defines these as examples of "feeling-technologies", or "mechanisms that do something with feeling" as a way to orient the senses of the audience member to the action happening onstage "effectively reducing the number of stimuli competing with the onstage performance" (28). We see this trend continuing with the frequent request for audiences to turn off their mobile devices and unwrap their candies before the performance, and more recently, to wear masks and social distance from other audience members, which serves the dual role of helping to keep people safe from COVID-19, and helping them to not think about their safety and COVID-19 during the performance. These practices seem to contribute to help create a mental "clean slate" to experience a performance. Many actors say there is a powerful felt energy that connects them directly to the audience, and even powers their performance. It may be that this only became possible when audiences were quiet enough to engage in this way.

Although audiences were sitting in darkness, much quieter than before, there were, and continue to be, audience members who chafe against silence in the auditorium. A continuous flow of audience members have been causing problems from the 19th through the 21st centuries, including loudly eating during performances, the "throwing of other choice objects" at actors, fistfights over loud conversations on mobile phones, and even one couple reported to be "apparently having sex in the audience" (Saxon). In a performance of "Hand to God" at the Booth Theatre, an audience member clambered onstage and attempted to charge his phone by plugging into a prop stage outlet (Viagas). These types of actions have enraged performers such as Daniel Craig, Lawrence Fox, Kevin Spacey, and many others, which Sedgman calls "moments of 'stage rage' all intended to shame offending audience members into submission during the moment of performance" (2). While we may chuckle as these types of behaviours, in doing so, we risk creating an unwelcome environment for new audiences. We must consider that it is the fortification of elitism and social status that privileges the "knowledgeable" theatre elite, who in turn establish that expected behaviour and label audiences as "behaving badly" when they deviate from those prescribed norms. The theatre sector cannot have it both ways; theatre companies with programs that seek to broaden the access must rethink expectations and actively seek to educate and develop – not just entertain – new theatregoers, as well as understand their own culpability in the development of that elite-first approach.

Differing styles of theatre also impact acceptable audience behaviour. Some forms specifically call for audiences to avoid silence, and actively respond. Saxon points out that

> […] by the mid-19th century, capaciously emotive and sometimes explosive melodramas – with scenes of danger, derring-do, and despair – held sway across major theatres. […] sound in the auditoria at this point was as likely to be sweeping approbation as discontent.

We also see this form of audience response in the format of British seasonal pantomime plays, with especially young audiences encouraged to interact with the performers and the story as it is being presented. Immersive theatre assigns similar behavioural expectations. Punchdrunk's popular New York production of *Sleep No More* invites audiences to freely roam a five-story building and interact live with "situations" presented by actors in a choose-your-own-adventure format (Brown). It should be noted that with new experiences comes new opportunities for behaviour that deviates from the norm, with actors of *Sleep No More* reporting several incidents of sexual misconduct perpetrated by audience members. Said one actor: "They're intoxicated… They're in this atmosphere that we've created where there are no limits, there are no rules, we're in a magical land right now — but in reality, you're still a person" (Jamieson).

While promoting free rein of a building full of exciting stories and interactive actors is unquestionably a fascinating marketing strategy, performers are feeling that experiences such as these are being created at their expense. So, it is encouraging that the theatre sector seems to be placing a higher priority to actor safety, employing specialists such as intimacy consultants (Swarbrick). However, in my career as a consultant to performing arts organizations, I often see that the spectacle outweighs the practical. I advise theatre practitioners that they may alleviate potential problems by considering questions such as "How might new and regular audiences 'behave badly' at this production?" and "In what ways might this production put performers and production staff at risk?"

Although the lines have blurred, elite social status is still considered to be a motivator for arts attendance. In the National Endowment for the Arts study "When Going Gets Tough: Barriers and Motivations Affecting Arts Attendance" work by Bourdieu in 1979 is mentioned,

showing that attendance at cultural experiences was a way for the economic elite in society to set themselves apart from the "lower classes". These elite were highly attracted to cultural events that were seen as high status in their peer group (Blume-Kohout, Leonard and Novak-Leonard). This idea that art increases status — what Konijn calls the "high-status hypothesis" — may contribute to readings of attendance behaviour of the affluent today, however, the degree to which it is widely relevant is more nuanced. As Konijn writes, speaking of society as of 1999: "[…] the cultural elite may be poor, and the financial elite may be poorly educated" (Konijn 169-194). Still, people bragging about buying tickets for the Broadway musical *Hamilton* at an average price of $1,200 USD at the time of this writing (Grant) prove that some cultural experiences are still only accessible by people with financial means, as well as the desire to attend. Konijn also describes work done by Ganzeboom, as well as that done by Maas et al. which divided cultural experiences into four characteristics: conventionality, unconventionality, complexity, and non-complexity. Conventional performances were ones that relied on common and accepted norms, while unconventional performances included progressive and experimental works. This "complexity-conventionality hypothesis" argues that complex performances required more capacity for information processing— social groups of people with a higher level of education or profession would gravitate towards complex performances, while those of lower professions and education would focus on more conservative art forms. It is important to note that this hypothesis does not seem to be in the spirit of warm inclusion that so many arts organizations try to share with audiences today. When considering those with restricted access to theatre due to economic reasons, it is difficult to think of a less elitist explanation than essentially stating "this performance is too complex for you". To combat this, the importance of special outreach programs such as that of Shakespeare's Globe Theatre in London is underscored. A

survey of the audiences for school performances found that 44% of attending teens had never set foot in a theatre venue before, to which Georghia Ellinas, head of learning at Globe Education said: "Watching a performance with other people becomes a more visceral and vibrant experience. It is something every student should experience before they leave school" (Coughlan).

I have established that theatre history plots the journey audiences have taken from rowdy to reserved, and that protecting elitism and social status has heavily influenced that journey. But little research has explored how the emotional experiences felt by audience members have been impacted. The ingredients for change do exist. For example, a change from theatre being primarily a social experience to the problematic concept of elite entertainment redirected audience attention to the performers. Lighting and staging changes I have discussed support the same transition, settling audiences in their seats, to engage with the drama unfolding on stage. And with this audience focused on the performers, instead of each other, storylines become more complex, performances more nuanced, songs more detailed, and potentially, emotions more intense.

To Make Money: Entertainment and Mass Revenue

As audience behaviour has changed, the intention of mainstream theatre has also changed. While it is beyond my scope to provide a detailed account of the shift towards commercialization of theatre, a few important points on the map can illustrate the journey.

Bloom, in exploring the emergence of profit-making theatres in the 16th and 17th centuries describes a theatre sector focused on "[…] turning playgoing into a commercial activity

that vied for customers in London's 'new leisure market'" (2). Bloom creates a fascinating link between commercial theatre and the gaming culture of the time (such as wagering on cards, backgammon, and chess) describing the change in asking theatre patrons to pay before seeing a performance, which was, itself, a new sort of gamble. Although Londoners had bet money on games for centuries "the idea of paying *before* seeing a play was a novel concept" (3).

Theatre creators also began to specifically focus on augmenting the emotional responses of audiences, presumably because they found that increased emotional response generated more ticket revenue. One popular strategy employed by theatres in 18th-century France was to strategically place decoy audience members throughout the venue, who would then applaud enthusiastically for the performance in an attempt to create similar responses from nearby audience members. These "claqueurs" (from the French phrase "to clap") evolved from a long history of orchestrated emotional response. Szubartowska describes the technique in use as far back as the 4th century Rome, where soldiers were ordered to cheer the emperor in an effort to "organize society by reaching the common people and gaining support for urban violence" (75). The strategy, originally designed to bolster productions that needed to be rescued after a failed premiere (76) was so successful that later years would find claqueurs implemented by theatres across Europe. Playwrights are documented as keeping credit/debit "accounts" with leaders of popular groups of claqueurs "as they would with a banker" (Barry). The claqueurs themselves were often "unskilled laborers and hard-up students who accepted their role merely for free tickets to a performance, which they would not have been able to attend otherwise (Szubartowska 76). Interestingly, I have found that nearly every modern theatre company seeks to attract younger audiences who, for whatever reason, are not regular attendees. These theatre companies employ a variety of strategies to do so, most often in the form of the "student rush"

low-priced ticket sold five minutes before the start of the performance. When measured, these have been found to be only marginally successful, as interest in theatre, not the price of the ticket, is often the barrier of attendance for young audiences. Perhaps a return to free admission in return for orchestrated audience response from students is a strategy worth testing in the 21st century.

Critics have commented on such techniques of counterfeiting emotion to influence crowd response. Columnist Johannes Weber, speaking in the newspaper *Le Temps*, wrote: "[…] the principal argument of those who defend the claque is that without this institution, theatrical performances would be very cold." Although he described that these defenders also believed that "claqueurs serve as coaches to the audience," in his opinion, "the freedom and spontaneity with which the audience expresses its feeling constitute on one its unquestionable merits" (Lacombe). The practice faded in popularity over the years and was rarely seen in Europe by the mid-twentieth century but is still a part of performances in present-day Russia, most famously with the Bolshoi Ballet (Barry). We can also see remnants of the claque in the form of "papering the house" or providing free tickets to a low-selling performance so actors have an audience to play off of, in comedy clubs, where audience members with infectious laughs are often admitted for free, and on modern television shows, where what once was a live audience has been replaced with a canned laugh track, in an attempt to influence the emotions of those watching at home (Szubartowska 78). Although I describe a theatrical experience that has shifted to entertainment, emotional manipulation and influence to benefit non-audiences members is still occurring, as I have shown it has for centuries.

What makes orchestrated affect management so successful? Psychology describes this phenomenon as "emotional contagion" defined as "the tendency to automatically mimic and

synchronize expressions, vocalizations, postures, and movements with those of another person's and, consequently, to converge emotionally" (Hatfield et al. 96-99). The authors theorize that humans unconsciously read the emotions of others, and allow their emotions to be influenced by others. We even seem to be able to detect emotions by scent. In one experiment, sweat samples were taken from subjects exposed to stimuli that made them feel fear or disgust. When asked to smell the sweat samples, a second group of people automatically displayed the same fear or disgust facial expression as that exhibited by the source (de Groot et al. 1417-1424). It seems that we are evolutionarily optimized for observing and responding to the emotions of others, and letting their emotions influence our own. While theatre has a history of creating artificial, paid opportunities for emotional contagion to take place, there is something undeniably emotional about seeing live theatre with a group of other people, as I will explore.

In the 20th century, transatlantic theatre continued to adapt to become focused on commercial entertainment, designed to generate revenue. In his 1925 update to "The Art Theater", Cheney describes an explosion of theatre activity in America, where creators have "[…] retrieved innumerable barns, barrooms, churches, studios, and other odds and ends of civilized building, […] and in these they have rigged up every conceivable sort of possible and impossible stage and are giving hundreds of plays thereon every week" (3). Cheney describes this group of "perhaps five hundred producing outfits" as "insurgent theater, and in its best manifestations our art theater" (4). In contrast, Cheney describes a competing commercial theatre missing the focus on the art itself:

> The 'inside' thing, the American commercial theatre, organized throughout the country as shrewdly, as ruthlessly, as the production, distribution, and sales-control of gasoline or aluminium, is conducted as a speculative business, with its first object the making of profits. […] the speculative manager drops any play, no matter how fine, if it does not show an immediate profit, and drops it permanently (18).

This trend toward commercializing theatre emotional experiences continued into the twenty-first century. The combination of music, song, and dance in musical theatre is designed to evoke an intense emotional experience from audiences catalysed around the combinations of techniques and effects. As an example, in his account of the 1987 production of *Les Misérables*, Frank Rich of the *New York Times* stated, "If anyone doubts that the contemporary musical theatre can flex its atrophied muscles and yank an audience right out of its seats, he need look no further than the Act I finale" (Rich). In the scene featuring the song "One Day More", Rich describes the characters occupying the Parisian barricades during France's 1832 June Rebellion as they deploy the red flag -- one of musical theatre's most iconic symbols -- used in military signalling to mean "we will fight to the death" (Bellos 56). Blair speaks of this emotionally moving song as an example of musical theatre's ability to generate and circulate intense feelings of empowerment (in this case, the fervour of revolutionary ardour for the characters, actors, and audience). Songs as a catalyst for emotional connectivity are an effective tool for musical theatre and have formed a trope that features across a range of productions. Songs from such shows have in themselves become icons of emotional experience, such as "Defying Gravity" from *Wicked* and "The Impossible Dream" in *Man of La Mancha*" (Blair 56). The commercialization of theatre hit a new milestone with the 1997 launch of the musical *The Lion King* by Disney, which, as of 2014, had earned more than six billion U.S. dollars worldwide (The New York Daily News). The success of *The Lion King* showed commercial producers a huge, new potential audience for musical theatre. Speaking in 1998 of the commercial potential of a new musical *The Civil War* by Broadway company Jujamcyn, company president and Broadway producer Rocco Landesman said: "It's a show that can be tried out of town, play some Pace markets, play

Broadway -- one of our houses -- and then be guaranteed a road tour […] It's perfect" (Singer). In what some may call proof that commercialization has infiltrated the highest levels of society and institutional power, Rocco Landesman went on to become the chairman of the National Endowment for the Arts in 2009, nominated by President Barack Obama (Gans).

Theatre artistic staff continually battle with the question of programming for the revenue and programming for the art, which can be seen in the U.S. theatre sector's reliance on the subscription pricing model. Subscription pricing evolved from an experiment by Thomas Betterton in the 1670s to raise funds for the building of the New Theatre in Dorset. "Subscribers" paid a share of the building costs as investors, and "received lifetime free admission to the shows" (Jain). The subscription model has gone on to become a lifeblood for most theatres, encouraging audience members to buy a season of tickets, which often include popular plays that are of interest and are known to be revenue generators, and lesser-known or newly commissioned plays with no following. In this way, the number of decisions to attend specific performances is reduced to just one: to purchase a season subscription or not. Subscriptions also allow a theatre company to received funds in advance of the production expenses for later shows in the season, helping the cashflow to produce those shows.

While commercialisation of theatre is now the norm, at its heart, theatre is storytelling, and no money need be exchanged to be a part of the narrative. As I will show, smart leaders have tapped into the emotional power of theatre to influence public opinion toward their personal goals with documented success, and without selling a single ticket.

To Promote Activism

I have established that many people attend the theatre to be entertained. But entertainment can also be the mechanism for the influencing of opinion through emotional engagement. Theatre that engages its audience to explore emotional topics can also influence, and even fully change, attitudes and perspectives. One of theatre's less overtly defined functions is to "keep society healthy by providing a platform for public conversation about human issues," thus to create a feeling of empathy between people of different experiences (Blank and Jensen).

In the 1960s, theatre was central to a national conversation on the rights of Mexican Americans. The award-winning theatre company El Teatro Campesino was founded by Luis Valdez, inspired by the vision of social equality and ethnic pride created by civil rights leader César Chávez. By creating plays that were aimed at field workers, but that also used storytelling and links to Mexican folklore to communicate Chávez' message, Valdez helped to recruit people to the movement, while encouraging other communities to create similar conversations through theatre ("ABC-CLIO"). The medium of theatre, experienced with others in a group performance, made it possible for an individual field worker to know that others felt the same way about their lack of rights. This provided a new level of confidence to speak up as part of a larger group for collective rights – a de facto unionisation and movement that later evolved into The National Farm Workers Association (Perez).

Others have used theatre to bring special attention to emotionally charged subjects. For example, the idea of hunting of wild game for food and/or sport is a polarizing one for many people. Audience attitudes and preferences around the subject of hunting were measured pre- and post-performance of an original musical theatre production called *Guys and Doe*s, which explored hunting from different perspectives. Results showed that some audiences changed their opinion about hunting after watching the play, with an increase in audience support for ideas

such as “Hunting has heritage and cultural values worth conserving” (Heide, Porter, and Saito 224-230). Another example, recognized for its compassionate exploration of the complex emotional areas of medicine, illness, and end-of-life decisions, is Margaret Edson’s 1991 one-act play *Wit*. In the play, the main character speaks to the audience about her experience as a stage-four ovarian cancer patient, a situation that many people have either experienced directly, or through the connection of knowing a friend or family member with cancer. The playwright uses theatre to show that although words often cannot fully capture a feeling, languages and humour can help people to process difficult experiences (Keaveney). The play won the Pulitzer Prize for drama, had a successful run on Broadway, and continues to be appreciated in performances around the world for its uncompromising look at death.

While audience members are often moved emotionally by watching a traditional theatre performance with personal relevance, the mechanism for how these experiences occur has not been explored. Little research into the psychology of how observing a theatre performance impacts opinion formation and behaviour can be found. However, applied theatre offers some anecdotal accounts, being specifically designed for attendees to work through emotional topics as active participants. Applied theatre has been defined as a form that “can uniquely place individuals in situations where they can interrogate some issue, confront a problem, and analyse their own relationship to the world in which they live” (Taylor 4). For example, audience members might first watch a scene based on interviews with survivors of a deadly event, and then be asked to discuss the actions of a character with the actor, while the actor is still in character. Breakout groups of audience members might explore how each person might have behaved in the situation as well as alternative actions and outcomes. Interactive monologues allow actors to stay loosely in character while answering questions, and audience members might

create written pieces, physical objects, interpretive dance, or other participatory activities to help create the experience. Taylor recognizes the potential for audiences to connect emotionally through the applied paradigm of participation:

> When participants in applied theatre believe they own the work, they invent more of themselves in it… the tasks that participants are given becomes a critical means for building belief and commitment (19).

In October 1998 in Laramie, Wyoming, Matthew Shepard, a gay student at the University of Wyoming, was beaten, tortured, and left to die because of his sexual orientation (Brooke). As a way of exploring the implications of hate around this horrific event, playwright Moisés Kaufman and members of the Tectonic Theater Project conducted more than 200 interviews with the people of the town. From these interviews, they produced one of the most-performed plays in the United States today, *The Laramie Project*, which would go on to influence the creation of the James Byrd Jr. Hate Crimes Prevention Act, a federal law against protecting the LGBT community (McKenna). In the play, we never actually meet Matthew Shepard; his life is portrayed by the observations and stories of others. While an audience member viewing the production has the opportunity to explore personal opinions and beliefs about homosexuality and violence, often forgotten is the impact that being interviewed and asked to reflect on the event had on the townspeople. Through this process, applied theatre techniques were used to create a traditional theatre production, and the outcome of the emotional applied theatre process is a part of the audience members' emotional experience.

At times, these emotional experiences can become unexpectedly intense. In some crossover from applied theatre, the format of immersive theatre invites audiences to personally engage with the story via tactics such as conversing directly with the characters or following the

story by moving from one room to the next. The rules that audiences have been conditioned to apply in "traditional" theatre often specifically do not apply to immersive theatre experiences, and this can become uncharted emotional territory for audiences. In an article on the popular theatre blog HowlRound, Weaver-Stoesz describes an immersive performance where audience members felt so strongly protective of a character that was about to be killed, they prevented the actor from proceeding with the script, shouting "we won't let you take her!" This display of empathy for a theatrical character may be thought of as extreme emotional engagement, but in immersive theatre, such emotional explorations are encouraged. These kinds of highly emotionally charged exchanges between artists and audiences (and the potential for increased revenue) is drawing the attention of the theatre sector with interest from conventional theatre institutions, including regional theatre and Broadway (Eckert). In describing a 2010 immersive production of *The Persians* in an outdoor mock-German village, Sedgman found that audiences were emotionally immersed in the story:

> Many people emphasized how the performance had successfully 'gripped' them from the very first moment. This signalled a desire to be pulled into the world of the performance during the opening sequence and not released until its end. However, this desire to be immersed did not equal a letting-go of critical engagement. For these respondents, although the event was experienced as 'immersive' and 'riveting', engaging with the performance's construction was still an important part of their enjoyment (136).

These types of immersive theatre experience create an intriguing opportunity to imagine how audience members, unshackled from modern social norms and attendance etiquette, might display their emotional connection to the characters, and what, if anything, "traditional" theatre might learn -- and implement within its own ruleset -- from these emotional interactions.

In the examples I have provided so far, theatre has been used to influence the emotions of audiences, for a variety of end goals. While performers may personally support these end goals, I will show that the performers themselves also have their own motivations for emotional experiences.

To Perfect the Art

Many theatre actors will agree that one of their biggest dreads is performing for a "dead audience". Personally, as a theatre performer, I would much rather have someone hate my performance than to not feel anything at all. While there is a running joke in theatre that actors constantly seek the attention they didn't receive as children, like any artist honing a craft, actors seek to present their characters authentically, with audience emotional reaction as a bellwether. The effective portrayal of emotions is a core goal for actors, and the way actors prepare for roles affects the effectiveness of their performances. Central to performance is an actors' ability to perform emotional labour, which Hochschild defines as the ability to "induce or suppress feeling in order to sustain the outward countenance that produces the proper state of mind in others" (7). To accomplish this, two key abilities are needed: "empathy, which involves reading the feelings of others, and social skills, which involves handling those feelings artfully" (Goleman 24). Speaking from personal experience, a core of the acting process is a continual assessment loop of how my words and presentation as an actor are affecting the audience. While in character, a portion of mental capacity is reserved for "reading the audience" and adjusting acting style to influence audience emotional response (such as putting in more energy to "wake up" a "dead audience"). Actor Estelle Parsons goes a step further, considering the emotional response of the

audience so fundamental that she uses it to define theatre itself: “I believe in things that move people. If the audience isn’t deeply caught up and moved to either laughter or tears, then I don’t think it is theater” ("Theater Talk with Estelle Parsons | AMNewYork”).

In the search for more authentic performances, actors have embraced emotion as a core of several prominent acting styles. Russian theatre practitioner Konstantin Stanislavski’s acting system provides a structure for an actor to present emotions as a “sense of truth” onstage (Lee 30). Practitioners of the Stanislavski acting system are encouraged to remember emotional reactions they have felt to situations in other parts of the actor’s life, and to use those feelings as a catalyst for accurately presenting similar emotions by using the situation happening onstage (the lights, set, other actors, etc.). Stanislavski encouraged actors to “live a life full of experiences” so that the actor would have a large reservoir of emotional memory to call upon onstage (32). Stanislavski’s system has been adapted and experimented with by many other actors, including Stella Adler, Lee Strasberg, and Sanford Meisner, the latter who is known for the “Meisner Technique” for actors ("The Sanford Meisner Center"). While these practitioners adapted Stanislavski’s acting system in a variety of ways, all of these acting styles involve the actor accessing emotional memories and transferring them to the character in some way (Wright).

Grotowski, a proponent of the style of acting known as self-expression, argued that actors should not try to conjure up emotions to feed to their character. Instead, the actor should present himself without pretending to be anything or anyone else (Konijn 43). The actor and the character become one inseparable entity, and anything thought of as superfluous to the actor and the character (such as sets, costumes, lighting, etc.) was eliminated. Audiences joined in with

these “happenings” in the 1970s, becoming active participants in the performance, with the intention of a greater emotional response.

Brecht, however, argued that actors need not bring their personal emotional experiences into stage work. Actors must instead focus on the accurate reproduction of emotions, and I will discuss this approach in more detail later in this thesis. This style of detachment focused on the “technical mastery over the portrayal of emotions, situations, and motives” (41). This form had the added benefit of flexibility in presenting works onstage – different character motivations and responses could be experimented with, and actors need not tire from repeated emotional labour.

While these “founding fathers” of acting styles may disagree with how emotions are accessed, manufactured, or reproduced, it is clear that emotion is a key to all of their acting methods. To this day, the actor (or C.E.O., politician, protestor, or military leader) who can best control and manipulate the emotional attention of the audience is the one that gets “cast” in the roles destined to move society emotionally for political gains.

Conclusion

I have established that contemporary mainstream, and indeed experimental, transatlantic theatre has repeatedly sourced ways to create heightened emotions in the audience member viewing the play. While acknowledging Brechtian paradigms are significant in theatre practice, my contention is that emotion is such an integral part of the experience, that a theatre piece which does not generate any sense of strong emotion risks alienating its audience, dislocating shared experience, and thus denuding the production of intrinsic meaning and social, or indeed revolutionary, value. It is because of this need for emotional reaction that audience members are

an essential part of every theatre performance (Cremona 379). And concomitantly, the audience's emotional and cognitive reactions to a theatre play impact their evaluation of that performance. As Scherer found in his exploration of audience reactions to music performance, audience emotional responses are complex and nuanced, and are not easily evaluated with current emotional measurement methodologies due to the risk of researcher bias of the results (239-250). Yet, we must recognize that audience members experience different degrees of emotional response, even within the framework of a social, shared, experience. Felner and Orenstein remind us that "no two audience members bring the same set of life experiences to a performance" and that "each audience member perceives a theatrical event through a personal lens" (29). I do concur that each audience member's life experience is different. Research has shown that once in the theatre venue, shared emotional experiences are a powerful influence, and individual response is an important consideration of a group experience. I will show that Felner and Orenstein's "personal lens" through which an audience member perceives a performance has a powerful effect on their emotional response to the performance, and that the effect of witnessing the event in a group can also affect the emotional response to a performance, for potentially one's full lifetime.

The theatre sector must increase our understanding of audience emotional experiences. Not to just sell more tickets, but to fulfil theatre's role of crafting better human beings. The willingness to try to understand someone with different opinions than your own is, I feel, at an all-time low, and theatre is a safe space to rekindle that conversation. Theatre should be a welcoming venue for everyone, *especially* for those with different beliefs than our own. It is in this "empathy gym" that we all can exercise our emotional muscles to become better humans, through the rituals and group social interactions in theatre. As I will show, without this focus on

using emotion as a tool for better communication, we risk forming a theatre sector filled with likeminded vehicles stuck in traffic, breathing our own exhaust.

2: Dynamics and Benefits of Prioritizing Emotional Engagement

> "When you come into the theater, you have to be willing to say, 'We're all here to undergo a communion, to find out what the hell is going on in this world.' If you're not willing to say that, what you get is entertainment instead of art, and poor entertainment at that." -*David Mamet*

Audiences have experienced theatre as a government tool to establish a moral compass, as a reminder of class and caste, as a powerful space to voice revolutionary fervour, and as a consumption option for entertainment. Throughout this journey, emotions have played a starring role, allowing theatre to serve needs at many levels, from those in power to those seeking escape or personal growth. The aim of this chapter is to show that, with the growing inequity between groups, distrust of government, and inability for people to engage in civil discourse, a new need for theatre has arisen. Much as Maslow's hierarchy of needs describes the pinnacle for development to be self-actualization (McLeod) theatre should now be sustained not to make money, but to become an "empathy gym" and a foundation for people to exercise self-improvement.

In this chapter, I explore the motivations for audiences to attend theatre, and how these motivations interact with ritual, emotion, and group experience. I argue that the conditions are right for a significant opportunity to prioritize the emotional experience of audience members. I

outline three dramatic benefits (generating revenue, generating empathy, and advancing digital productions as a new form) that the theatre sector will gain from theatre companies prioritizing emotional experience design, and argue that the path to these benefits must include a new focus on measuring the emotional experience of theatre participants.

The dynamics of emotional theatre experiences

A wide variety of entertainment options exist inside the home, such as social media, live streamed movies, and board games. Yet, theatre audiences still work to overcome barriers to theatre attendance, such as finding performances to attend, navigating in new neighbourhoods, struggling to find parking, and the technology skills needed to purchase an online ticket. I contend that people navigate these obstacles and avoid competing offers because of the emotional benefits that come from experiencing live performance, including the rituals associated with preparing to attend, the experience of attending as a group, and the incorporation of the meaning made from the performance experience into one's everyday life. These individual emotional benefits cumulatively benefit society, through the creation of more informed, empathetic citizens. As I will show, this is accomplished by people gathering in groups for a ritualistic experience with lasting impressions.

Audiences enjoy feeling emotions during theatrical performances. Speaking from personal experience, the act of empathizing with characters who are portraying strong emotions on stage -- both positive and negative -- is pleasurable. This includes emotions that are associated with socially unacceptable behaviours such as violence. Koestler refers to this process as "emotional window shopping," describing "the pleasurable experience is derived not from

anticipating, but from imagining the reward; and the satisfaction obtained". Indeed, levels of emotion experienced in the theatre may exceed those felt in real life. Schoenmaker (as cited in O'Toole et al. 2014) claimed that "human intellectual and emotional response to a performed event in the theatre can be greater and more complex than were we to witness the same event in reality". Audiences experience what Schoenmaker calls "aestheticism emotions" or the ability to appreciate emotional portrayals by the actor, and to experience more intense emotions as an audience member. In short, because they know the play is fiction, any consequences for experiencing emotion in a real-life situation are removed, thus offering another contrast to the concept of Aristotle's catharsis. Eversmann describes parallels in accounts of theatre attendees and how they experienced moments of significance in a performance, which he calls "peak experiences" or "performances that are highly valued by the individual; productions that can be said to represent a 'real event' for this onlooker". Audience members experiencing a peak experience report that they feel a "heightened sense of consciousness […] the sense of time is lost" and that "often the spectator is deeply moved on a personal and emotional level, which causes the performance to have such an impact that it is stored in memory for a very long time" (139). These highly emotionally charged events in theatre fit the concept of "flow experiences" as adapted for theatre by Eversmann from Csikszentmihalyi and Robinson's 1990 work on aesthetic experiences (Csikszentmihalyi and Robinson). Participants attending the theatre for intrinsic pleasure focus their attention on the activity, temporarily losing sense of past and future, and experience a loss of self-consciousness. (Eversmann 144). Clearly, not every theatrical experience will be a "flow experience" for a variety of reasons. Perhaps the audience member has seen the show produced elsewhere, and has decided they don't like the script. Perhaps a roadside argument over a parking spot outside the theatre venue may influence an audience

member's readiness to receive the work. It may be that no outside influence is needed at all, and an audience member walks in simply not in a receptive mental space. In her book *Theatre & Feeling*, author Erin Hurley contends that:

> Cultivating a receptive mood in audiences that may enhance their experience of a given act has often been a job for the theatrical music – produced by the circus band or, in many nineteenth-century popular entertainments such as melodrama, music hall, and vaudeville, by the pit orchestra (22).

Even with these and other obstacles, it seems that a true flow experience at a theatre performance is memorable, and an attractive goal for theatregoers. While I agree that music is a useful tool to help audiences to receive the work, there is a vast land of untapped opportunity to help audiences have emotional experiences as part of the core value offered to them by their theatre company.

As a professional working in the theatre field, I have repeatedly considered the analogy of the emotional impact of a theatre experience on audiences to be similar to the weather control strategy of cloud seeding. Airplanes drop particles of silver iodide in the cloud, raindrops form around this catalyst, and then fall as rain, increasing the capacity of a cloud to produce rain or snow by providing condensation nuclei to the atmosphere. I suggest the term "emotional cloud seeding" for theatre practice, by which I mean that modern audiences, triggered by the catalyst of theatre as a mixture of intellectual stimulation, education, empathy, and entertainment, experience an emotional release that is individual, but is heightened by that the collective, shared experience. Audiences relate, emotionally moved by the collocation of practices that form the "theatrical silver iodide" of the production onstage. Continuing the analogy, I will show that if the emotional clouds of audience members are seeded by the performance, then the airplane used to get them there is made of the ritual of theatre attendance, and the emotional influences of the group members attending around them.

Theatre Rituals

The relationship between theatre and ritual has been widely discussed in theatre and performance studies, with several authors suggesting variations of similar lines of thinking. Richard Courtney describes theatre and ritual as two kinds of formal dramatic action grounded in feeling, stating that: "Theatre codifies dramatic action into an art form, whereas ritual codifies it […] by repetition for social and cultural purposes". He describes rituals as:

> […] signifiers that re-present, synthesize, and circulate symbols in complex social cultural felt-meaning… they are social and symbolic actions performed in imitation of models… they have, thus, a dramatic and feeling character (Courtney 36).

Courtney suggests that rituals "contain symbolic signs for understanding, interpreting and negotiating events of life" and, in archaic societies, ritual and myth were "one entity" and "myths were the stories that had to be enacted in rituals" (38). Where the stories our cultures pass on from person to person may have been performed by the shaman, actors become a modern "supernatural being, a spirit, or a god" (39). Courtney seems to be describing rituals as special experiences that are elevated from the norm, perhaps like the "metaphysical fear" that Antonin Artaud sought audiences to experience. Graham-White expands on this idea through a useful analogy: "By using a term [ritual] that belongs to a different cultural form, the artist alerts his audience to feel in the presence of this work as they might in the presence of the analogous cultural form" (318). Thus, ritual and theatre are brought closer together, in effect setting expectations for audiences to feel in theatre what they have previously felt in ritual experiences (though still separating them). Rozik takes a similar approach, saying "ritual and theatre do not

constitute a binary opposition: they operate on two different ontological levels" (347). He goes on to say: "directors invented artificial ritual elements, based on superficial knowledge of real rituals" (105).

Other scholars have focused on how ritual and theatre are connected, instead of simply defining them as separate entities. Saxon agrees that ritual and theatre operate on separate planes but suggests that "ritual has become the subject matter of theatre" and that "ritual and theatre entwine inextricably, developing through intercultural contacts, accretions, and historical transitions" (5). It is clear that the similarities between ritual and theatre are noteworthy.

Schechner, a key critic of performance studies exploring the changing dynamics of theatre, describes ritual as "an event upon which its participants depend" and theatre as "an event which depends on its participants" (211). He further outlines a binary system between efficacy (the goal being to accomplish some real result that benefits a group of participants) and entertainment (performance for its own sake, for personal gain, for pure fun, etc.). He argues that efficacy and entertainment, as two strands of a constantly inter-relating entwined structure, have fluctuated throughout history: theatre in the late medieval period was dominated by efficacious church services and morality stories, while the public theatres in Elizabethan period tended towards pure entertainment "constantly adjusted to suit the tastes of a fickle audience" (211). Schechner suggests that theatre flourishes when these two opposing forces come together, resulting in times when Western theatre:

> […] answers needs which are both ritualistic and pleasure-giving […] efficacy and entertainment are present in nearly equal degrees (209). Whether one calls a specific performance ritual or theatre depends on the degree to which the performance ends toward efficacy or entertainment (Schechner and Schuman 207-218).

In effect, the end results of both theatre and ritual are so similar, separating them no longer seems useful. The average theatregoer is not concerned about labelling an experience as ritual or not. They simply know if they are moved emotionally in ways that feel bigger than themselves or profoundly meaningful in some way. Audience members at a powerfully moving theatre performance can experience a sense of spiritual uplift that improves one's life and changes future behaviour as I have experienced personally. As I will show, the science of measurement of physiological expressions of emotion does not differentiate theatrical experiences in the sense of efficacy and entertainment: heart rate, blood pressure, and skin conductance all change based on the emotions felt by the audience member, irrespective of the source of the stimulus.

Attending a play for entertainment instigates social and performative rituals. These rituals are integrated, forming shared group connections, and are part of the process of "seeking positive affect, cognitive stimulation, social engagement and a sense of belonging" (Meeks, Shryock and Vandenbroucke). And these rituals of theatre are not simply confined to the venue. Some audiences experience ritual both long before and far after the actual performance: the preparation to attend and the discussion afterwards, the collective efforts to pick a date to attend, the dinner at a favourite restaurant before the show, and the post show discussion over drinks are all examples. The process of ticket booking/collection, dressing to attend, and finding your seat in the midst of the "hushed conversation" of the venue were found to be part of a larger theatre attendance ritual catalysed around "anticipation of going in the first place" (Walmsley 13). Some will experience the theatre as ritual during the performance itself. In describing the "visceral need to see a show", journalist Laura Collins-Hughes wrote of theatre being a religious experience:

> […] the moment the music started, rich and choral and enveloping, I could feel it soothing my soul. The ritual of theater, too, was a comfort: a group of strangers, sitting together in what I think of as a sacred space, breathing the same air as the actors, listening as they told us a story. It had nothing to do with religion, or faith. But that was church to me (Collins-Hughes).

While scholars focus on the historical relationships between ritual and theatre, such matters are unlikely to feature overtly in the decision-making of the average theatregoer looking for a play to attend. From the perspective of the audience member, theatre intrinsically includes ritual.

It is clear that the perspective of the individual must be considered in any definition of the experience of attending the theatre. Yet, it is rare that a performance has an audience of one. Another defining characteristic of the emotional experience of attending theatre -- and one vital to the concept of the "emotional gym" -- is the influence that fellow audience members have on the experience of the individual. As I will show, attending a performance with others in the audience has a profound impact on the individual experience that all in attendance contribute to, consciously or not.

Theatre Experienced in Groups

Throughout history, theatre has been performed before a collected gathering of people. Experiencing performances in a group both individually and collectively influences the emotional experience. People gathering in a group for events (such as attending a performance, a sporting event, or other cultural rituals) often experience what Durkheim calls "collective effervescence", or a "mutual, rhythmic entrainment" and sense that the emotions being felt are strengthened by the act of sharing them with others feeling the same thing, at the same time

(Durkheim). Although Durkheim describes religion and the behaviour of religious people in groups, his work also applies to attendance at a play. We have seen theatre as ritual, and theatre has also been described as a religious experience: "But the secular can also be spiritual, the habit of worship transformed into the habit of theatregoing" (Collins-Hughes). Durkheim supports this idea, with a definition of religion which simultaneously seems to describe a theatre experience:

> When a certain number of sacred things have relations of coordination and subordination with one another, so as to form a system that has a certain coherence and does not belong to any other system of the same sort, then the beliefs and rites, taken together, constitute a religion (42).

A theatre stage is a sacred, ritual space. Actors are protected and also isolated from the audience via the "4th wall". Certain rites and rules of conduct are recognised by theatre attendees: they are expected to know, as part of the ritual of attendance, when to stop talking, when to applaud, when to leave the venue, and how to behave in a group setting. At first glance, this all sounds like a lovely, in-group experience. But not all shared group emotions are positive. LeBon, warning of the danger of a crowd of people feeling the same emotion, argued that "crowds are only powerful for destruction […] ideas, sentiments, emotions, and beliefs possess in crowds a contagious power as intense as that of microbes" (128). So, while there is disagreement on the positive or negative results of the way behaviour is influenced by a crowd, it is clear that when people gather together in groups, they experience emotions differently than they do when acting as individuals.

Theatre audiences gather as groups for shared emotional experiences for every performance. While Collins (building on Durkheim's work) does not specifically mention theatre audiences as an example, his suggestion that "interaction rituals" transform raw emotions (such

as anger, joy, and sadness) into an emotional sense of solidarity accurately describes the journey that audience members take, together, via the narrative arc of a play.

Drawing on the idea that communication and proximity-to-others creates the group-influenced emotions that Collins' work explores, "interaction rituals" are created when three things occur:

- A group must physically assemble closely enough to share "micro signals" through voice, body language and facial expression among the group members. Collins explains that "when bodies are together in the same place, there is a physical attunement… a palpable change in the atmosphere… the bodies are paying attention to each other, whether at first there is any great conscious awareness of it or not."
- Group members must be mutually focused on the same experience, with a clear sense that others are sharing the same experience.
- Group members must feel a common mood or a shared emotion.

When these three factors sufficiently occur, "both the emotion and the mutual focus become stronger" (299). Group members feel a sense of common identity and solidarity. They share symbols of their common membership in the group (such as supporters of specific sports teams wearing national flags or football jerseys to identify their allegiance). They experience a sense of belonging and "rightness" in adhering to the group, and they share "emotional energy" — a phenomenon that Collins pioneered to describe the feelings that group members take with them, "giving them confidence, enthusiasm, and initiative" after the experience (300). People attempt to form chains of repeated positive experiences that heighten emotional energy and avoid those that drain emotional energy (301). He predicts that:

> […] what we think about, at any particular moment, is socially determined […] the sequence of interaction rituals in which we have taken part, and which we anticipate will come up in the near future (301).

While to my knowledge no theatre company provides members with symbols of common membership such as team jerseys (and as a side note, much can be learned from the emotionally charged loyalty and self-identity that sport fans feel about their teams) theatre audiences participate in an exchange of energy that influences their emotional experience in many other ways, such as laughter.

Consider the infectious sound of people laughing at a comedy club, the influence this seems to have on laughter in the group, and the social norms it creates. Why do we laugh more in groups? Freud spoke of laughter being a discharge of amassed psychic energy that requires distribution in socially acceptable ways (Morreall 246). Expanding on Freud, Morreall posits that: "laughter results from a pleasant psychological shift" in human emotion (249). In an interview about his work researching the emotional connections that happen during comedy performances, Miles shared that "[…] we laugh not so much because something is objectively funny… but because we want people to like us, or we want to feel part of a group that is laughing - it's all about connections" (ScienceDaily). We see here an example of the "collective effervescence" that Durkheim describes. The group itself amplifies the emotions felt as individuals. And both Collins and Freud speak of an "energy" that exists, is transferred and augmented between those present, and leaves with them after the experience, becoming part of a positive memory and reflection. As I will discuss from a psychological perspective, actors also often speak of an "energy" between actor and audience that is vital to the experience. Actor

Maggie Smith asserts: "There is a kind of invisible thread between the actor and the audience, and when it's there it's stunning, and there is nothing to match that" (Simpson).

This energy is usually well controlled within a range of acceptable behaviour, based on cultural limits and expectations called cultural display rules. These rules are defined in a study from Safdar et al. as:

> […] culturally prescribed rules, which are learnt early in life through socialization. These rules influence the emotional expression of people from any culture depending on what that particular culture has characterised as an acceptable or unacceptable expression of emotion [and] dictate how, when, and to whom people should express their emotional experiences.

For example, North American display rules permit the showing of anger emotions significantly more than Japanese display rules – an "angry American" display would violate these social norms in Japan. Safdar et al. also found that gender differences were significant, with women expressing sadness and fear more than men, and that people switch emotional display rules depending on the situation. While I am not aware of any specific studies exploring cultural display rules in theatre audiences, it seems safe to say that these rules are likely pervasive at a performance, and are influencing the emotional responses of audience members depending on who they are interacting with, and as I will show, their status as "insiders" or "outsiders" in the shared social group.

Shared emotions are an important factor in creating and maintaining social groups. Members of voluntary groups such as, "teams, fan clubs, social clubs, bands and orchestras, theater ensembles, political parties, religious sects, as well as other identity groups" often become emotionally attached through shared emotional experiences (Salmela 8). This "group factor" is so important to maintaining the perception of success that theatre producers in the U.S.,

facing low sales for a performance, often "paper the house" by giving away free tickets. In a story for the Los Angeles Times, one production manager commented "It's always just the last couple of days when you know it's going to look like a disaster, and you want to save face." But this strategy risks alienating paying customers. On finding out that a venue was distributing free tickets haphazardly, one audience member said: "Here I am, the stupid one who gets stuck spending over $100, and everyone else was walking in free" (Grein).

So, the list of ingredients to create a memorable group emotional experience seems to include, at least, shared emotional energy, social proof of being part of the "in" group, and the application of culturally specific display rules that influence how emotions are shown when others are present. Attaining this level of group interaction is so important, theatre companies are willing to give away for free one of their most valuable resources – the theatre ticket – to try to guarantee that these group interactions occur. As I will show, several opportunities are now available that allow theatre companies to provide these emotional experiences to benefit individuals, society, the long-term sustainability of the theatre company, and the theatre industry as a whole.

Emotional engagement as a path to new revenue

A greater focus on understanding the emotional experiences of audiences has the potential to dramatically increase revenue for theatre companies though increases in ticket sales, subscriptions, and donations. Audiences have clearly communicated that a key motivating factor for attending the theatre is "the pursuit of emotional experiences and impact" (Walmsley). In the 2011 study, participants described the search for an "emotional release" or "hit," and that success

was found if the theatre piece "hit an emotional chord" (11). Some audience members even prepared in advance for the heightened emotions that the performance would bring by meditating before a performance to "clear the mood" (13). Audience members also cited "empathy," "being drawn in and engaged," and "exploring human relationships" to be reasons they attended live theatre (14). In another study of 1300 active and prospective theatregoers in New York, respondents said that "having an emotional experience" was important to them, along with "having an educational experience" and "culturally enriching myself" (Garbarino and Johnson 929-949). The authors go on to explore how the role of the performance of the actors influences audience emotional response:

> The key service being offered is the actors' performance, and because the quality of this attribute significantly affects the attainment of both goals, it is expected to be important for all customers. If the acting is bad, an audience member is more likely to become annoyed or distracted than attain either relaxation or enrichment.

Other researchers have found similar results. The performance of the actors is a strong source of emotions in audience members (Konijn). On the relationship between audiences and actors, the more the audience is made to care about the characters, either positively or negatively, the more audiences are moved emotionally, and "[…] the more likely they will appraise, in retrospect, the drama experience as positive and enlightening". When audiences feel the reverse -- indifference to the characters -- the experience is bound to be "emotionally flat" (Zillmann 33-51). I agree that the actor's performance is important, however it is only one of many factors. Even if the acting is poor, the social experience may create a cherished positive memory. Equally relevant is the anticipation to attend that audience members feel, the research audience members complete before and after the performance, the shared experience of watching the performance with other people, and the discussion of the performance with others on the way home. Identifying exactly

where audience members will engage is difficult. As a practical example, a client of mine, San Jose Stage Company, came to me to design a marketing plan for their production of "I Am My Own Wife" by Doug Wright. The play covers the life of Charlotte von Mahlsdorf, a German transgender woman and antiquarian who survived through the Nazi and Stasi regimes. In advance of the performance, the theatre company and I created and emailed a pack of background information for audiences, which patrons largely ignored. In reviewing the email marketing analytics however, we found that audiences went back and engaged deeply with the content we had thought as preparatory. It seems that seeing the play inspired emotional engagement and encouraged subsequent immersion in the life and times of the characters and the world of the play.

While a trend on attending for emotional benefits can be seen here, it is clear that the interpretation of "emotional benefits" is subjective. This highlights the importance of thinking of audience members as individuals instead of "the masses". The entire experience of attendance is valuable to the buyer, not just "the performance". Clearly, keeping audiences entertained, emotionally satisfied, and thus primed to come back for another production is good business.

While theatre makers often hope that their work will create intense emotional experiences, it is important to understand that audience reactions are likely influenced by a wide variety of other contributing factors in the interaction chain. The experience of purchasing the ticket, the interactions with the venue staff and fellow patrons, and the quality of the wine at the interval all play a part. In short: the play may have been emotionally amazing, but an otherwise positive interaction chain can break if the total attendance experience isn't positive. Customer satisfaction requires meeting customer expectations. In a 2004 study commissioned by the Wallace Foundation, 57% of play attendees said "having an emotionally rewarding experience"

was a major motivation for attending a play, but only 43% said they achieved that goal (Ostrower). That gap between expectations and results begs the question: why aren't audiences getting the emotional engagement they are looking for? The study does not elaborate on how respondents measured an "emotionally rewarding experience" but it is clear that some audiences are looking for emotional experiences and not finding them.

From a sustainability perspective, increasing attendance, either by first-time attendees or regulars who are attending more frequently is a vital business objective. In a 2006 study, researchers exploring "repurchase intention" or how willing patrons were to attend the theatre a second time after their first experience, found that attaining a different emotional state, experiencing good value, receiving high service quality, and leaving with a sense of satisfaction were all goals (Hume et al. 135-148). Audience members also repeat behaviours that allow them to feel positive emotions, and patrons who feel positive emotions during a theatre experience feel that theatre is more important and relevant to them, leading to repeat purchases (Troilo, Cito and Soscia 635-646). And yet, in my experience as a consultant in the theatre sector, the strategy I have seen most often employed to influence a second purchase is discounting, and when the discounts stop, often so does the repeat attendance. Even with discounting, getting first-time audiences to return is a challenge for many theatre companies. In a 2014 study of 17 organizations in Philadelphia, 70% of new patrons attended a single performance, and then then didn't attend again in the year following their first visit ("2014 Patron Loyalty Study: Loyalty By The Numbers). This metric should grab the attention of theatre leadership at every company. Clearly, existing repurchase strategies are not working. As I will show, replacing discounting strategies with experimentation on increasing first-time attendee emotional engagement may increase attendance at future productions, driving much-needed revenue for theatre companies.

Emotional engagement as a path to new digital artistic experiences

Strategies that influence audience members to return to the venue are useful, but only when the venue is allowed to be open to the public. In March of 2020, the outbreak of COVID-19 virus caused theatre venues in both the U.S. and the U.K. to close indefinitely, with New York City Mayor Bill de Blasio saying "I don't want to see Broadway go dark if we can avoid it. I want to see if we can strike some sort of balance" (Horton). Little did he know that the pandemic would go on to shutter venues for nearly two years. The pandemic dramatically cut revenue for U.S.-based performing arts companies by nearly 54%, and decimated jobs in the cultural sector. Yet, with every emergency comes opportunity. The COVID-19 pandemic created opportunities to explore the importance of experiencing theatre performance within a group of audience members at a physical venue, and the preferences audiences have related to digital productions. Due to venues being closed, theatre companies were forced to pivot to an unchartered territory of digital productions, accelerating a slow-moving trend and influencing audience behaviour through access to "safer" entertainment options (Guibert and Hyde). Saturday March 21, 2020 was supposed to be the opening night for many theatre productions, instead shuttered due to COVID-19 restrictions. Many theatre companies immediately began to improvise with digital programming, which I have categorized in three waves: digital replacement performances, digital transition performances, and designed-for-digital/hybrid performances.

Digital replacement performances

Seeking to replace revenue, many theatres initially scrambled to get the rights to create recordings of the current productions to make them available online, or resurrected recordings from past productions to sell digitally. Of the many performances I attended, the majority resulted in a poor digital product. This was likely due to a variety of factors. Many theatre creators had little experience in creating digital productions, and lacked proper equipment for creating high production value. As an example, many productions were shot on a mobile phone from the back of the venue, resulting in hard-to-hear audio and an inability to see the actors' facial expressions. When these productions were placed online, audiences initially bought them enthusiastically, with several of my clients showing high ticket sales and donations. In comments made on sales and donation transactions, audience members shared that they thought they were helping the theatre company by supporting their digital offerings. However, analysing the metrics of digital attendance revealed that many audience members were purchasing digital access and then never watching. For one of my clients, a analysis of the sales data showed that 50% of purchases went unwatched, and this finding matched what artistic directors at other theatre companies were finding at the time. As the months of the pandemic continued, I observed that purchases and donations for digital productions began to fall. I can only speculate that production value of the recorded digital productions was a factor, as audiences sitting home had access to much high recorded production value in streaming services such as Netflix.

Digital transition performances

In the first quarter of 2021, in response to declining sales, many theatre companies transitioned new "traditional" productions to being recorded and distributed digitally. Some attempted live streaming productions with actors separated by social distancing. This might be

remembered in history as a “golden age” of digital access to theatre, with a glut of content available to be consumed by audience members from their own home. This also provided an exponential leap in accessibility to those who are physically unable to go to a theatre venue (such as those in hospital, people living out of the area or country, etc.). One survey respondent captured their excitement for this new level of access from the home as:

> I think that online programs created tremendous accessibility. My elderly parents are paying for and watching more online cultural events. Disabled people have been able to have greater access too. Lastly, to be able to watch something that is up either indefinitely or for a certain period of time, with a different variety of times it is offered, has been incredibly helpful. I believe they call this asynchronous accessible watching. ("March 2021 NYC Cohort Results”).

However, sales for these transitioned digital recordings, even considering new levels of accessibility, were flat. When the digital sales did not materialize, rather than examine their value proposition, 50% of theatre companies in the U.K. abandoned their efforts (Sherwood). What does the lack of attendance at digital events mean in terms of audience behaviour? Is the problem one of lack of knowledge: are audiences not aware that digital productions exist? Is it a question of perceived value? Research must be done to determine the factors at play. My hypothesis is that, burned by paying for initial low-quality experiences, audiences were reluctant to pay again, fearing similar low-quality product. It is important to note that “product” in this sense is not just the production value of the digital experience. Often overlooked in discussions are the missing social and emotional benefits attained through in-person group dynamics that are lost when attending digitally. For example, many theatres experimented with producing theatre on the Zoom software platform, which dominates the market (Mendoza), but have run into obstacles. Technology solutions such as Zoom have been found to be poor methods of social presence, reducing participant’s means of communication through channels such as verbal cues,

facial expressions, gaze, gestures, posture, physical proximity, and back-channelling cues (Andres 39-48). In speaking about the limitations of producing theatre on digital platforms, MacArthur describes the missing social and emotional elements:

> Living their lives on the Zoom grid, our students cannot linger in a lobby after a performance or a hallway after class to process what they just watched and the feelings that it may have stirred (MacArthur 49-53).

So, although the production value of the digital content itself is slowly improving, even the most engaging content shot on the best equipment does not create the rich fabric of group emotion that can be found in the theatre for a live performance. Theatre meant for the stage, transitioned to be presented online, will always be "less than" the experience of seeing the production in the theatre.

Designed-for-Digital/Hybrid Performances

To succeed as a new source of revenue, digital productions must be designed from the ground up to be consumed digitally, using as-yet-untried storytelling and engagement techniques that utilise the capabilities of the new medium. Storytelling has a long history of adapting. The addition of sound to the silent picture introduced new ways of telling the story through dialogue and more theatrical scenarios, allowing more complex "plot twists, montages, and clever exposition" (Bordwell). Playwrights are starting to explore this new medium, writing plays to be experienced virtually, such as David Yee's *good white men*. In the made-for-Zoom play, we are given an outline of the plot and characters:

> Kyle, Chad, and Wyatt stage an intervention for their friend Dylan, believing that he is not supporting the Black Lives Matter movement because he is not posting enough

> about it […] the play is viewed from the perspective of Chad's desktop as he clicks through various platforms, including Facebook, Twitch, and Instagram Live (Sumi).

Theatre critics from the New York Times, suddenly asked to start reviewing plays on Zoom, have had mixed responses, criticising aspects of the experience but praising the accessibility and potential for new ways for audiences to interact. Maya Phillips commented:

> "I've had issues with the aesthetics of a lot of the Zoom plays. But one thing I do love about this hybrid form of theater is how it allows audiences to engage in a way that's more active. Sure, it's not live, in the sense of everyone sharing the same space, but it's possible to invite individual audience interaction in a way that, say, immersive theater would have."

Fellow writer Jesse Green said:

> During the month it was available online, the first Nelson Zoom play -- "What Do We Need to Talk About?" -- was seen by more than 80,000 people. It would have taken something like 400 performances, a year's worth, to reach that number live at the Public Theater. But it's not just about easier access, it's also about newer content. I have seen so many things I might never have been able to see before. (Brantley, Green and Phillips).

Crucially, as theatre companies experiment with new forms of digital productions, producers must also continue to experiment with bringing people together within the digital platform to encourage and enhance that imperative sense of group experience. In a follow up to his research on interactive ritual chains (covered previously), Collins points out:

> The more that human social activities are carried out by distance media, at low levels of interaction ritual intensity, the less solidarity people will feel; the less respect they will have for shared symbolic objects; and the less enthusiastic personal motivation they will have in the form of emotional energy (64).

Low levels of solidarity and respect are the opposite of what theatre needs to thrive. It is important to note that while theatre producers may think that audiences are buying access to the art with their ticket purchase, they are also buying access to a shared group emotional experience, equal, or potentially more valuable to the consumer than the access to the art itself. Collins may paint a dismal picture of emotionally suppressed audiences, but this is not a new idea.

It is clear that in 2021, online performances are perceived as a very different theatre experience. Much of the social connections and ritual of theatre is gone. I submit that purchasing a link to watch a pre-recorded performance at home, alone, is, in effect, no different than watching a Hollywood movie at home. This may help explain why audiences have been slow to uptake digital efforts by theatre companies, flocking instead to the budget and scale of entertainment-only media giants such as Netflix (Thomas).

While additional research must be done, logically, theatre audiences may be more attracted to digital experiences if attendance rituals are introduced to the digital experience. As I have shown, audience members have reported that these rituals are important to them. For example, talkbacks are a tool employed by many theatre companies to help audiences to make meaning from the performance experienced, which Bennet also identifies as being socially important:

> In a publicly experienced cultural event, the opportunity to talk about the event afterwards is important socially. […] Reception of a performance can be prolonged by group discussion of all aspects from general appreciation to specific questions to other group members about small details of the production. Beyond the ability to talk over the production, either immediately or some time after the performances, audiences may follow up by reading the text (if available), by reading reviews, or (at a later time) seeing another production or even a subsequent movie adaptation. All these acts have the potential to reshape initial decoding of the production (168).

Digital versions of these sorts of rituals might include joining the virtual session 15 minutes before the start of the production to meet in breakout groups of attendees for an informal chat (similar to a conversation that might be had with a person sitting next to you in the venue), video exchanges showing audience members dressed up in the theme of the show, post-show virtual talkbacks, and discussion or "meaning making" on how audience members feel after the performance. I have attended theatre industry networking events on Zoom, where 2-4 participants are put into breakout rooms and given a prompt to discuss, and I have found this format to be excellent for creating connections between strangers. This format seems well suited to add value to the digital experience by bringing audience members together for prompted conversations.

The majority of recorded theatre productions marketed to date have allowed audiences 24/7 access to watch the production at the time of their choosing. This makes the creation of social connections difficult. By instead setting a specific time that productions will be streamed, theatre companies will likely be more successful in creating social connections between digital audience members, simply because everyone will be gathered together at one time in the virtual space. The resulting increased social interaction, additional value through curation by artistic staff, and closer match to the expectations of a traditional performance may all contribute to increased audience satisfaction.

Hybrid theatre experiences also show promise. In an unpublished experiment in 2020, City Lights Theatre Company held a "group watch" of a one-man production of "A Christmas Carol". Audience members were invited to join in on the Zoom video conferencing platform for a live meet and greet, followed by the playing of a recorded version of the show, and ending with a discussion with the actor and the director. The event attracted 50 people, and feedback

following the event was positive, with one audience member saying that the format “made it so much more intimate… I think it worked so well” ("City Lights: A Christmas Carol").

Although theatre companies should be praised and encouraged for experimenting with digital performances, we must recognize that videoconferencing software such as Zoom, designed for business meetings, does not have the features needed to fulfil the digital performance needs of many theatre companies, or the emotional expectations of audiences. There is an opportunity for new software to be designed, specifically with theatre companies in mind, that would include features such as remote control by digital stage managers, control over camera angles and camera switching, simple ways to share outside media streams, ways for audience members to interact with the performance, flexible ticket purchase and watch options, and compatibility with home theatre equipment, to name a few (Evans). New obstacles must be overcome, such as the potential for unstable internet connections, the separation of the creative team, and “the difficulty of capturing the sensation of liveness that theatre is known for”. This may lead to new benefits, such as the ability for playwrights to collaborate and write about contemporary issues much faster than the years it can sometimes take to get to a full-fledged production (MacArthur, “Hope Springs…”). Theatre producers know how to create theatre for audiences in a venue. However we must change the expectation that setting up a camera and pointing it at the stage somehow creates the magic of theatre — it does not. What it does create is comparisons with streaming content providers such as Netflix and Hulu, who have hundreds of millions of dollars for high-end productions. and that is a comparison that is unwinnable by even the largest and most well-known theatre companies. Expectations must be reframed that recorded or live-streamed theatre is in any way like the in-venue experience. Support (financial, artistic, etc.) must be allocated for experimentation on new forms of theatre featuring designed-for-

digital productions that the traditional in-venue theatre can't match. To be clear, digital productions should not stand in for in-venue performances. Digital performances must be allowed to find best practices on their own, as a new and unique form of theatre storytelling.

Current research supports my suggestions. In April 2020, I was asked to be an advisor on Audience Outlook Monitor, an international collaboration between researchers, funders, arts service organizations and individual cultural organizations to study the pandemic's effect on the cultural sector and audience behaviours, and to help to make informed decisions about how and when to reopen venues (Audience Outlook Monitor). To date, the research has involved 24 global study partners, 660 participating cultural organizations, and more than 620,000 survey responses. A major focus of this research effort was to explore audience preferences around digital productions. Participant theatre companies in the study have created a variety of digital experiences, including providing access to recordings of in-venue performances, recordings of new performances designed for digital consumption, live performances of plays happening in a venue, live productions happening online (via software such as Zoom) and even group watches of pre-recorded content. Audience members responding to the survey have commented on the kinds of digital programs that interest them, such as:

> Probably talks, readings, etc. I don't mind the occasional Zoom play, and I think I've realized recordings of theater can be powerful. But live music and live theater are absolutely irreplaceable and irreproducible… [I would be interested in] programs developed specifically for online viewing (i.e., not a filmed version of a live production) ("February 2021 New Jersey Cohort Results")

Survey results show that 67% of respondents anticipate that digital programming will play a small role (53%) or a substantial role (14%) in their cultural life after in-person programs have fully returned (9). When asked about their consumption of online cultural programs, 31%

said that in the two weeks prior to answering the survey, they watched and paid for such programming, with 26% saying they watched and did not pay (8). The survey did not ask cultural groups about their frequency of producing online cultural programs, so fluctuations in reported attendance may be influenced by access to what is available to attend at any given time.

In a June 2021 study from the Audience Agency in the U.K., 35% of respondents aged 16-34 reported that they at least "agree" that they were engaging with digital content from arts, cultural and heritage organizations "to reduce stress and anxiety" and 56% saying they were engaging "to boost my mood" ("Digital Audience Survey"). Engaging in digital content, such as listening to music, has been shown to reduce stress (Thoma et al. e70156) and may help mitigate the effects of social isolation, which has been an ongoing concern during the months of lockdown of the COVID-19 pandemic. This social isolation caused by the pandemic also represents an opportunity for theatre companies to engage with their audiences in meaningful ways that will likely be remembered by thankful audience members once venues reopen.

So, it is clear that attending a digital performance is not a replacement for the experience of attending a live event. However, there is still an opportunity to beneficially connect with each other in a digital space. Gupta showed that there is an abundance of art "flourishing as an antidote to the COVID-19 pandemic and panic arising across the world" including people meeting up online for virtual jam sessions that have become a "therapeutic vehicle for empowerment, solidarity, and collective action (Gupta 593-603). Sadly, many experiences that have been provided by theatre companies online do not allow for even basic connections between audience members, reducing the control audience members have on their experience: "For an online show, the spectator no longer chooses what to focus on, he receives what is offered to him" (Iacobuţe 133-137).

As I have shown, when offered digital recordings of productions to purchase, audience members often fail to show up, even when they have paid for access. Possible reasons include buyers considering the digital ticket purchase more as a donation to the theatre company, time constraints and inexperience in making space in one's schedule to watch a digital production, competition from mainstream producers of digital content (such as Netflix and Hulu) or the lack of the rich social experience one gets by attending an in-venue performance seen live, in a physical room with others. .

Liveness

Also at play, especially in recorded productions, is a missing element of "liveness," where "the sense of place implicates a sense of community (Liedke 10). Bennet finds liveness to be a key component in theatre:

> Unlike the printed text, a theatrical performance is available for its audience only in a fixed time period. Furthermore, the event is not a finished product in the same way as a novel or poem. It is an interactive process, which relies on the presence of spectators to achieve its effects (68).

I agree. Even when performances are recorded with a live audience interacting at all the right points, watching a recording is still something less than the experience of watching the performance live along with that audience. Theatre companies often market the "convenience" of watching these recorded digital production whenever you like. The National Theatre advertises "Unmissable theatre, whenever you want it" and "stream unmissable British theatre anytime, anywhere" ("National Theatre At Home"). This "convenience" establishes a partial place (your home) but no time, and no community. Liedke doesn't define the opposite of "liveness" (deadness?) but it may be useful to consider liveness as a factor in the value provided by virtual

productions. When Peter Gelb, managing director of The Metropolitan Opera launched live simulcast productions that audiences can watch at their local movie venue, critics did not have high expectations. “When he launched the HDs, everybody thought he was out of his mind. Who is going to go to a movie theater to see opera?” (McCreesh). Results show that The Metropolitan Opera brings in approximately $18 million USD per year in revenue, showing performances in 2000 venues to 2.7 million people (Midgette), so something is working, and this success may be due to “liveness”.

Barker outlines seven aspects of “liveness,” while also suggesting that there might be others:

1. Physical co-presence with performers and performance
2. Simultaneity with the performance
3. Direct engagement and absence of intervening technological mediation
4. Sense of “local” within the experience
5. Sense of interaction with performers
6. Sense of interaction with others in the audience
7. Intensified experiences/participation through sensing any of the above (Barker 17-34).

Barker’s seven criteria of liveness are all present at a traditional Metropolitan Opera performance at Lincoln Center. Watching a live-streamed performance at the local cinema with other audience members in the room fulfils at least four (Simultaneity with the performance, Sense of “local” within the experience, Sense of interaction with others in the audience and Intensified experiences/participation). The Metropolitan Opera has now launched a new

streaming service “Met Opera on Demand” where audiences pay $14.99 USD a month to stream “more than 750 full-length Met performances” ("Metropolitan Opera On Demand”). Applying Barker’s criteria, this new service arguably scores a zero on liveness, and while some will find value in never-before-access to 750 recorded operas, the service may not be an attractive value to those seeking the social and emotional benefits — and the intensified experiences — that traditional live performances create.

For those theatre companies investing in presenting virtual performances, other obstacles remain. For example, some organizations have found that they are unable to secure permission from theatrical licensing companies to stream a production. Concord Theatricals informs producers that:

> […] ’virtual’ production rights aren't available from Concord Theatricals for many shows. These rights are not held or controlled by Concord Theatricals, and we will have to send your proposal to the author’s representatives for approval on a case-by-case basis … There is absolutely no guarantee of this permission being granted ("Concord Theatricals”).

Even if live-streaming licensing is secured, increased fees for actors, and the required use of expensive technology can be barriers (Main).

A pivot from simply selling digital productions to focusing on creating emotional engaging experiences stands to benefit both theatre companies and consumers. As I have shown, existing offerings can easily increase emotional engagement by adding a group social component, such as with “group watches” of pre-recorded content. This would allow audience members to meet up and chat via video online before consuming a pre-recorded theatre experience together, and then participating in a live talkback after the pre-recorded performance. Once venues fully reopen, these digital productions may find additional acceptance as in-venue

projected viewings. Audiences would gather to watch a digital theatre piece in a traditional theatre space on the big screen. And as-yet-to-be-designed forms of digital storytelling will likely emerge from theatre companies willing to continue experimentation. All that is needed is a decision to measure and attempt to increase the emotional responses of audiences to any content offered.

Emotional engagement as a path to reopening theatre venues

Theatre venues, beginning to reopen after the COVID-19 pandemic restrictions have lifted, are finding that audiences say they are eager to attend again, but that sales of tickets to in-person theatre events are sluggish. Results from the Audience Outlook Monitor study exploring audience preferences around reopening venues show that theatre audiences are anxious about returning while still longing to return once conditions are "safe" (notably, the definition of "safe" is subjective, individual, and constantly changing). The introduction of multiple COVID-19 vaccines has reduced risk for virus transmission. As of September 2021, results from the study show that 99% of theatre audiences who responded about attendance to live theatre in New York City are either partially or fully vaccinated (Brown). However, barriers to attendance remain. State mandates for proof of vaccination at theatre venues were seen as a favourable action: 42% of respondents say they are "more likely to attend with policy" and 47% say they would "only attend with policy" (5). But even with these additional safety measures in place, audiences are still apprehensive about returning to venues. Only 48% of those who responded said that they were "ready now" to attend again, with 44% sharing that they were "waiting for low infection rates" (4). The survey questions offered the option for respondents to include comments on their

answers, which allowed some to express their reluctance in their own words, such as one respondent in Chicago:

> I will relish returning to in-person events when the risk for myself, my loved ones and the community is clearer and substantially diminished. With the increasing presence of the Delta variant and overall positivity rates again rising very recently, it is clear we have a bit further to go...so I will remain safely at home and continue to participate in virtual opportunities, until that time ("LOCT July 2021").

Some theatre companies have had success thinking outside the venue, such as performing outdoors. In Adam Szymkowicz's play *The Parking Lot,* "audiences watch from their cars while tuning in to a local FM station to hear the mic'd actors" and in Montana Repertory Theatre's production of Jean Ann Douglass's *The Fog,* "patrons brought their own camp chairs to watch actors who never came within 12 feet of each other" as they performed outside around a fire tower (Loewenstern). Other venues are experimenting with virtual reality to create social presence and allow audiences to connect with each other (Wallisch). Concerned audience members will likely not return until they feel subjectively safe to do so, making the job of attracting audiences to return a Herculean task for theatre marketing staff. Doeser has suggested that theatre companies should immediately begin to communicate the normalization of COVID-19 as an acceptable risk, which is as an important step to helping audiences to feel comfortable to return.

As audiences explore their feelings on returning to theatre venues, the promise of receiving positive emotional experiences may be a powerful motivator to overcome the uncharted territory of fear that the person sitting next to you in the theatre venue has COVID-19.

Emotional engagement as a path to personal impact

Much research and reporting has been done on the economic value that the theatre sector brings to society (Crews). This is of course useful information to policy makers and theatre leaders alike, but is an effect of theatre attendance, not a cause. To address this, researchers have made attempts to understand the intrinsic impact that attending live performance has on the individual (for example, see McCarthy et al.; Brown and Novak; White and Hede). The results from these studies describe live performance as a complex, personal experience. It is important to explore the impact and benefits that a theatre performance can create, especially from the perspective of emotion.

Researchers around the globe have suggested several frameworks for understanding the impact that attending theatre has on audience members, and, in line with results on the performing arts in general, emotional response is seen as a key component of impact. The New Economics Foundation (NEF) published the "Audience Experience Framework" in 2008, which found that "personal resonance and emotional connection" is one of five measurable reasons people find theatre experiences "worth coming out for" (Jones and Pulford). Researchers found that "the experience of a personal connection with the narrative unfolding on stage – as it were, seeing something of yourself in the performance – was identified strongly both in the interviews and in the survey as a powerful means through which theatre can impact on people's lives" (15). Walmsley's 2013 study on the impact of theatre among attendees interviewed in both the U.K. and Australia found the "biggest single motivator for theatre-going transpired to be emotional impact, and several respondents confessed to seeking an 'emotional release'" (Walmsley 73-87).

Respondents also commented on the importance of theatre to create emotional bonds between friends and family members.

In interviews with 45 professional theatre practitioners in China, respondents experienced "intense emotional responses when they were able to project their own stories and experiences onto the stage and compare their own experiences with the dramas" and that "intense emotions as elicited through seeing a performance is a cleansing experience" (Chan, Au and Hoyan). Musical theatre is also enormously popular among university students in China, providing "an affective experience" through a connection with Western culture, which may be "helping young Chinese to think and act differently from their parents and grandparents" (MacDonald 112-120). As another example, Plastow shares the powerful benefits of Theatre for Development, describing the emotional learning opportunities through theatre Ugandan women have found to communicate their experiences of being female in contemporary Buganda society (111). Plastow contends that entertainment and efficacy are both important to create change in society, because a "boring performance is never going to influence anyone" (124).

Arts experiences that create strong emotions also create strong memories. In a study of 14 performing arts companies at universities across the U.S., audience members who were interviewed about their history with the arts were able to describe in vivid detail arts experiences that happened up to 40 years ago because of the emotional weight attached to the experience (Brown and Novak 13). This phenomenon is not specific to the theatre, however. Experiences where strong emotions are felt (either positive or negative) create more vivid memories (Reisberg and Hertel). By creating vivid memories of theatre experiences, theatre practitioners can impact the lives of audience members for many years to come, and potentially a person's whole lifetime. Emotional involvement and empathy play a significant part of respondents'

overall evaluation of attending a theatre performance (Boerner and Jobst 391- 408). A 2012 study of 58 theatre productions found that when asked to choose three reasons why people attend the theatre, respondents prioritized 'to relax and escape,' 'to be emotionally moved,' and 'to discover something new.' Audience members who attend the theatre frequently were found to be "more likely to cite emotional and intellectual reasons for attending". Surveys included an open-ended question asking about the emotions respondents were feeling as they left the venue, and the results showed audience emotional responses to be complex, and that "different performances take audiences on unique emotional journeys" (Brown and Ratzkin).

Attending theatre offers many benefits to emotional wellbeing, some long after the performance ends. Students in grades 7 to 12 who attended theatre increased tolerance and acceptance of diverse people and ideas, increased empathy, and increased literary knowledge as compared to students that watched a movie version or read the book of the same play (Greene et al.). In 2015, The National Endowment for the Arts explored the literature on the emotional benefits of arts participation (defined as music-based activities, drama/theatre, and the visual arts) to children from birth to 8 years. Findings show that arts programs are positively related to the development of social skills and emotional regulation (Menzer 8) and when used as a therapy, benefits children with autism (13). Older adults exposed to theatre classes showed improvements in memory, comprehension, and problem solving (Noice and Noice 56-79) and participatory arts experiences provide documented "mental/physical improvements in memory, creativity, problem solving, everyday competence, reaction time, balance/gait, and quality of life" (Noice, Noice and Kramer 741-753). These studies show that theatre's contribution to emotional wellbeing is well supported in the literature, but the methods used in the studies leave important factors of audience emotional experiences unexplained.

All studies mentioned have used surveys or qualitative interviews as the method for gathering audience responses. These methods have advantages, such as low barrier to use, simplicity of data analysis, and low cost. However, there may also be disadvantages to these methods, such as the potential for respondents' reactions to change between seeing the play and answering the survey. Additionally, studies that only gathered data after a performance fail to address what happens during audience emotional response as they are watching the play. As I will show, technology now allows any theatre company to explore physiological responses to a theatre performance, and, used in a mixed-methods approach, may reveal new insights to the way audiences respond emotional to attending the theatre.

Audience engagement and participation

In an era with many other options for entertainment, creating an emotional theatrical experience has taken on new importance. To strengthen emotional experiences, deepen relationships and increase attendance, many theatre companies have created programs to increase the participation of theatregoers, referred by the industry as "audience engagement." What expectations do audience members have for a theatrical performance? Do they want to engage a little, or a lot? To answer, it is important to consider the journey that theatre audiences go through, from deciding to go to reflecting on having gone. Audiences who are better prepared may have a more personally meaningful experience. This highlights one of the most-cited theories on the customer journey of performing arts audiences: the concept of the "arc of engagement" (Brown and Ratzkin). The arc of engagement suggests a five-step audience journey that audience members experience by varying degrees each time they attend a performance:

1. **Build-up**: the first stage, from the decision to purchase the ticket, where anticipation begins to build
2. **Intense preparation**: the gathering of contextual information about the performance, becoming "knowledgeable" about what the audience member is going to experience
3. **The artistic exchange**: the transfer of emotion and meaning between the artist and the audience member (what some would call the actual arts experience
4. **Post-processing**: the period of time following a performance where the audience member attempts to make meaning out of what they have experienced
5. **Impact echo**: thought to occur when artistic exchanges and post-processing are exceptionally powerful and meaningful, which can impact the rest of one's life in memory and action

The authors share that entry and exits into this "conveyor belt of sorts" are not necessarily linear. It is possible that every audience member has a unique "arc" based on his or her preference for engagement, and this may be impacted by the art itself (for example, previous knowledge of a story might cause someone to need to prepare less beforehand, and low production value might cause an audience member to want to skip post-processing, if the experience was not meaningful).

Rohd sees audience engagement as a four-part process:

1. **Reaching out** to new "potentially interested community constituencies" in relation to a specific play
2. **Augmenting** existing audiences' experience of the play through "events and strategies offered on site, online, and even beyond the walls of the institution."

3. **Creating** and producing shows that employ "non-traditional uses of site" and audience participation.
4. **Developing** new work in partnerships with community members "with an emphasis on the local aspects of art making and presenting."

In a way, audience engagement activities are a return to what was normal in the theatre for centuries. As I have shown, only in the last 200 years has the current "traditional" experience of attending theatre become one of sitting quietly and observing the story unfolding onstage, applauding where appropriate. In *Engaging Audiences*, author Bruce McConachie gives a great example: "Aristocratic auditors at the Paris Opera in the middle of the eighteenth century arrived at performances late, left early, and spent most of their time chitchatting in between" (McConachie 2). While modern theatrical produces might refer to this behaviour laughingly as "audience disengagement," in truth, the choice to pay attention or not pay attention was in itself a form of engagement. These behaviours would not be acceptable in most theatre venues today, and the responsibility for creating an engaging experience now includes additional activities provided by the theatre company before, after, and sometimes during a performance with the goal of encouraging audience members to build anticipation about attending, prepare knowledge, and make sense of what they see onstage. As I have shown, attaining emotional payoff motivates attendance, so these activities directly connect to revenue.

Since it is currently impractical to try to create a custom engagement experience for each patron (an intriguing idea whose time may come) theatre companies employ a variety of strategies to emotionally engage different groups of audiences with like preferences at a deeper level. One might compare these activities to teaching someone to appreciate subtle flavours in

wine — while wine can be appreciated without any training, increased knowledge leads to more emotionally enjoyable tasting experiences. Audience engagement tactics often include:

- Allowing audience members to have access to the actors for talkback and reflection on the work
- Inviting audience members to consider how they feel via critical thinking questions on social media after a performance

  Encouraging different cultures to attend the theatre to better understand each other
- The creation of affinity events with local businesses near the theater (such as a partnership for a "girls' night out" at a hair salon before attending a production of *Hairspray* (Pesner).

Theatre leaders searching for other ways to increase the economic vitality of theatre may learn much from the loyalty tactics seen in the marketing of sport, and applying those tactics to the theatre experience. For example, wearable merchandise is a financial boon for the sport industry, with the global licensed sports merchandise market to reach a value of 27.2 billion USD by 2027 (Global Industry Analysts). While not everyone is going to buy a theatre team jersey, theatre companies should experiment with encouraging audience members to display their support in the clothes that they wear, perhaps providing other incentives to do so. Long-term donors and subscribers might be recognized for their support via an exclusive, commissioned lapel pin or other unique item, which can be worn and recognized by others. Additional opportunities to employ loyalty strategies found in sport include increasing the marketing focus on first-time attendees through personalized communications outreach, "buddy" systems to link a new attendee with an experienced attendee, and "theme nights" which have been found to be a

useful driver for first time attendees to sporting events (Burns). These tactics all focus on the social aspects of attending a sporting event and clearly show that the sport industry realizes that the game itself is only a small part of the overall emotional experience of attending – a lesson the theatre industry will greatly benefit from exploring. This is not an exhaustive list, and engagement is only limited by the creativity of the theatre company. It is likely that different types of people respond to different engagement strategies, and that these groups of people can be defined by their engagement method of preference.

Conclusion

The conditions are right for theatre companies to prioritize emotional engagement. Doing so stands will generate new forms of revenue, ease audiences into new forms of theatre designed for digital consumption, and help audiences return to in-venue performances. At the heart of all of this, emotion connects people together. Theatre companies have an opportunity to create benefits for individuals, for society, and for the theatre company itself.

I have shown that experiencing theatre in a group not only influences, but augments the emotional response of each individual, similar to the attunement that occurs at religious ceremonies, as people "contaminate" each other with intense emotions. The expected behaviour in the venue where these exchanges take place has changed radically over time, from the once rowdy social theatre experiences to the more quiet, observational behaviour we see today in many performances of mainstream theatre. I have shown that the COVID-19 pandemic has underscored the importance many people assign to theatre attendance, and that people are willing to experiment with accessing other forms of theatre experiences (such as outdoor, digitally

recorded, and digitally live-streamed performances), although the technology and infrastructure to deliver satisfactory experiences is in its infancy. In this process, I have defined three stages of digital productions and suggested ways to increasing emotional engagement through introduction of social and group dynamics. I have explored what researchers feel are the frameworks for how emotional theatrical experiences are processed, and how emotional expectations likely drive motivation for attendance.

While the behaviour of transatlantic theatre audiences changed in the 19th century to become quieter and more intellectual, the COVID-19 pandemic may be the catalyst for this to change again. For two years, theatre audiences have been asked to stay at home, avoid other people, and perhaps watch a recorded play on their computer by themselves. This move toward further individualism and isolation has the potential to seriously damage theatre attendance behaviour, and through extension, a resulting loss of revenue and sustainability for theatre companies. As of the start of 2022, audience research shows that audiences are seeing fewer productions, with 50% of respondents to an April 2022 survey saying they have not returned because they have "not yet found a program I want to attend" (Brown). It is my opinion that theatre organizations should prioritize the reintroduction of the social aspects of theatre attendance as a hedge against this pattern of isolationist behaviour. This might take on several forms. The venue may be opened earlier and stay open later, so that audiences have more time to connect with each other. Group engagement activities might occur at the interval – perhaps asking audience members to think of one word they are feeling at the end of the act, and to share that feeling over a conversation with others in the room. We have seen that the social aspect was a cornerstone of theatre attendance behaviours in the 17th and 18th centuries, and therefore likely a pleasurable experience. If "everything old is new again", this alone may help to increase

attendance to pre-pandemic levels and beyond, helping to create a more sustainable economic outlook for the theatre sector.

To prioritize emotional experiences in audiences, we need a viable method of measuring emotional experiences. As I will show, the measurement of physiological response is an established science, supported by decades of research and recently advanced with the advent of new technology employable by any theatre company.

3: Physiological Response and Emotion

> "There was a feeling in him like a bruise, a purple ache that set between his ribs. He tasted a cry building at the back of his throat. It was too familiar and made him fearful." -*Richard Wagamese*

How might theatre experiences change if every artistic director focused on engaging audiences emotionally? While my hope is that every theatre leader is interested in conducting experiments on emotional response, especially given the existing societal conditions and opportunities, there are important factors to consider. The aim of this chapter is to provide theatre leaders with a basic understanding of the science of measuring physiological response to emotion, so that this knowledge can be adapted for the use in any theatre venue. To do this, I provide a background on our current understanding of emotion, how the body reacts physiologically to emotions, and how those physiological changes can be measured, in preparation for use in a theatre context. I explore the different methods of measuring emotions and explain the value of using physiological responses to create real-time data on what people are feeling. I argue that physiological response is directly related to emotional response and is a well-studied method of measuring emotional responses in other fields. I make the point that until recently, tools to measure physiological response required large machines in a lab environment, incompatible with the experience of attending live theatre. Advances in miniaturization and wearable technology have now made it possible to take the lab into the theatre venue. In

Appendix 2, I provide web links and pricing for all physiological measurement equipment reviewed. In support of theatres prioritizing emotional engagement and having a reliable method of measuring emotional response, physiological measurement shows much promise.

Defining emotion

The Oxford English Dictionary currently defines an emotion as "any strong mental or instinctive feeling, as pleasure, grief, hope, fear, etc., deriving from one's circumstances, mood, or relationship with others" (Oxford English Dictionary). Although the study of emotions has been an ongoing process spanning many centuries, creating a standardized definition of an emotion is difficult. For example, the definition of emotion is influenced by the language and cultural experience of the definer. The thousands of languages of the world have evolved to explain emotions in many ways. This has led to a lack of any commonly agreed-upon definition, causing continual misunderstandings and unending debates by researchers that ultimately slow the research process (Mulligan and Scherer 345-357).

Over recorded history, the challenge of defining emotion has been taken up by many researchers, philosophers, and behaviourists, to little agreement. Fehr and Russell sum up this disagreement well: "Everyone knows what an emotion is, until asked to give a definition. Then, it seems, no one knows" (Fehr and Russell 464-486). Young concluded that:

> Almost everyone except the psychologist knows what an emotion is… the trouble with the psychologist is that emotional processes and states are complex and can be analysed from so many points of view that a complete picture is virtually impossible. It is necessary, therefore, to examine emotional events piecemeal and in different systematic contexts.

While Young's approach provides freedom from needing just one definition of emotion, it introduces the need to compare, and potentially combine, multiple subjective experiences. Consider the parable of the blind men and the elephant. Never encountering an elephant before, each man touches one part of the animal, and defines the total creature solely by the subjective experience of touching, for example, the tusk, the trunk, or the tail. Approaches to defining emotion have followed a similar path; researchers have created definitions based on the exploration and observation of emotion from many angles. Reconsidering and augmenting summaries by Plutchik, and later by Fantino, a new summary by Kleinginna and Kleinginna describe 92 different definitions of emotion, broken into 11 non-exclusive categories, including categories based on the experience of pleasure and displeasure (affective definitions), the results of emotion helping an organism to meet its survival needs (adaptive definitions), emotion as a response to external stimuli (external emotional stimuli, physiological, and emotional/expressive behaviour definitions) and, underscoring just how much disagreement exists in the scientific community, a category on sceptical statements, which "question or deny the usefulness of the concept of emotion" (349). Indeed, most languages explored by researchers contain "specific words or expressions to name what would be labelled as 'emotional states' in academic English" (Ogarkova et al. 50). Fehr and Russell compared concepts defining emotion as "mental pigeonholes with precise boundaries" and that emotions can be defined and described in ways other than a classical definition (465). They explored the usefulness of defining the concept of emotion via experiments with prototypes or examining and ranking the "best" examples of a concept (466). Results show that people can show that they understand a definition of emotion by ranking emotions such as love, fear, and anger as better examples of the concept of emotion

than less prototypical examples such as respect, awe, and calmness, all without the need of a classical definition (471).

With a goal of incorporating "traditionally significant aspects of emotion while attempting to differentiate it from other psychological processes" Kleinginna and Kleinginna propose this working definition of emotion (355):

> Emotion is a complex set of interactions among subjective and objective factors, mediated by neural/hormonal systems, which can (a) give rise to affective experiences such as feelings of arousal, pleasure/displeasure; (b) generate cognitive processes such as emotionally relevant perceptual effects, appraisals, labelling processes; (c) activate widespread physiological adjustments to the grounding conditions, and (d) lead to behaviour that is often, but not always, expressive, goal-directed, and adaptive.

While some may use terms such as emotion, feeling, and mood interchangeably, there are important differences which help in defining emotion. Courtney suggests there is a distinction between emotions (the affective) feelings (the aesthetic), and moods which fall somewhere in between. Emotions:

> […] are seen as undifferentiated and come upon us quickly… are always particular about something — fear of a tiger, say, or love of a person. […] In contrast, feelings are reflexive such as "contemplating a sunset" (Courtney 14).

Feelings "lead to choice and judgement about values and quality…" and moods lie somewhere between emotion and feeling, which Courtney describes as "emotional feelings" (110) after acknowledging that describing such phenomenon with words alone is difficult. As we perceive the world, our "perception gives us sensations that we respond to first through feeling" (21), and that all media have different capabilities to carry both feeling and meaning, but that dramatic acts

in particular are so powerfully charged with *felt-meanings,* that they are usually beyond the reach of language (22-32).

A detailed explanation of the world history of emotion is beyond my scope and has already been accomplished by others. However, highlights of the vast range of interpretation of emotions underscores their complexity, as well as an ongoing interest in explaining and understanding them. Plamper and Tribe take us on a roller coaster journey of emotional theories, including Aristotle's idea that emotions such as anger have both positive and negative aspects (13), the concept of *atua*, or an external spirit that needed to be excised from Māori warriors who were found to be trembling in fear before a battle (4), Galen's doctrine of human temperament which ascribed emotional responses to imbalances of blood, phlegm, yellow gall, and black gall (16), and Augustine's idea that emotions were guided by the moral quality of a person's will and the acceptance of God's mercy (17) among others. Plutchik's psychoevolutionary theory of emotion posits that emotions provide evolutionary benefits that increase survival, a view buoyed by Darwin's findings that emotions act as communication signals of intentions and tend usually to be reactions appropriate to emergency events in the environment (Plutchik and Kellerman 5). Wallbott and Scherer suggest that an emotion is a group of symptoms defined as the evaluation of a situation, physiological change, motor expression, motivational effects with prepared action tendencies, and expression of a subjective feeling state (56). As I will show, while we now rarely need to run from animal predators, emotions provide an evolutionary survival benefit, expressed in part physically. The link between emotions and physiological expression is hardwired into each of us and can be used to explore emotions even when language fails us.

A great contributor to our understanding of emotions is the work of psychologist Paul Ekman, who proposed that humanity shares six basic emotional states (happiness, sadness, fear,

anger, disgust, and surprise), acquired evolutionarily, no matter one's cultural background, geographic location, or upbringing (Ekman 155). The notion that emotions are thus "universal" was hypothesized by Charles Darwin in 1846 in his work "The Expression of Emotions in Man and Animals" proposing that emotions evolved as an evolutionary protection mechanism; a way for a creature to quickly respond to stimuli, such as the need to run from a predator (Darwin). As Darwin was unable to fully test these theories, Ekman and Friesen designed an innovative experiment using the Fore tribe of Papua New Guinea. This tribe was one of the few remaining groups in the world not exposed to mainstream media, allowing for a pristine exploration of emotional response. Ekman and Friesen found that when presented with stories about people feeling specific emotions and asked to identify what the person in the story was feeling via photos of facial expressions of emotion, participants selected the same facial expressions as people from other cultures around the world (Ekman and Friesen 124-129).

Not all psychologists agree with the theory of basic emotions, and the debate has been raging for decades. Researchers such as Margaret Mead argued that emotions were culturally specific, learned behaviours (Capocasa et al. 32-33). Hufendiek has argued that some basic emotions such as fear may exist for evolutionary and survival reasons, while other emotions such as pride, shame, and jealously require higher cognitive abilities (66). She suggests that we need to reconsider the concept of "basic emotions" since "what remains to distinguish emotions such as fear and disgust from emotions such as pride and shame are only very vague and gradual features" (67). Other researchers have suggested that emotions share both universal and cultural-specific aspects. Matsumoto's suggests that being a part of the "in group" changes emotional response: collective cultures encourage members to "foster emotional displays of their members that "maintain and facilitate group cohesion, harmony, or cooperation to a greater degree than

individualistic cultures" (132). While research is ongoing, we arrive at the idea that some emotions are biologically based, some may require higher cognitive ability and require some sort of social construct, and even then, how emotions are displayed and perceived is filtered through culturally based display rules. Simply the act of translating an emotion into a language to discuss it is an abstraction, relying on the nuances in specific language to try to label specific emotional states. This has led some cultures to describe emotions that don't exist in other languages. For example, the Brazilian term "saudade" described as "a feeling of longing or nostalgia that is supposedly characteristic of the Brazilian temperament" (Clarkson-Heaps). Another, "naches" is a Yiddish word that describes the feeling of pride a parent gets from the accomplishments of their children (Prager)

The difficulty researchers have faced in attempting to define emotion has shown that emotions are complex, and working models for explaining them must factor in multiple criteria. As another angle to understand this complexity, researchers have explored the physiological response that the body has when an emotion is being felt.

Physiological response to emotion

As emotions are experienced, the body responds physiologically in a variety of ways. This is based on unconscious behaviour not under cognitive control. For example, each of us has millions of eccrine sweat glands, highly concentrated on the palms, fingers, and soles of the feet.

Researchers have theorized that the ability to create extra sweat on the hands and feet in an emergency provide mammals with additional traction to escape a predator, including primitive man (Everts). The Autonomic Nervous System (ANS) combines the sympathetic nervous system (responsible for bodily functions needed to quickly change our arousal response to a stimulus such as heart rate, and blood pressure increasing to escape a threat) and the parasympathetic nervous system, which controls slower activities such as digestion and reproduction (McCorry 78). The ANS is always active to keep the organism in homeostasis. When a stimulus such as a threat is encountered, the ANS reacts by changing our arousal response It is these changes in the body's arousal response that can be measured from a baseline in response to a provided stimulus (Alshak and Das). Russell considered physiological response to be mappable via a circle on an X/Y scale, with X showing valence, or the degree the emotion is a positive or a negative emotion, and Y showing the degree of arousal being felt (from low to high). For example, "paranoia" would map as a negative emotion, with a high amount of arousal, while "contentment" would map as a positive emotion with a low amount of arousal.

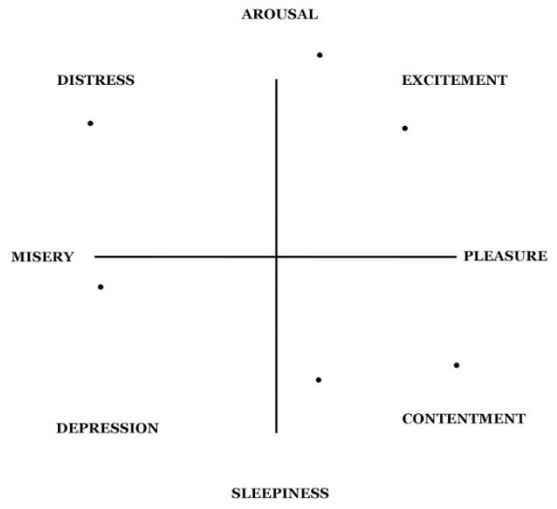

Fig. 1: Russell's Circumplex, based on original: tinyurl.com/russell1980

The degree to which an emotion is felt can be mapped as well: “joy” would likely map higher on the positive emotion scale than “happiness” (1161-1178). Russell’s arousal/valence scale is widely used in the measurement of physiological response to emotion, as it works well to visualize electronic measurements. Researchers have attempted to take the logical next step: trying to identify a specific pattern of physiological response for each emotion.

William James is credited for being the first to suggest that different emotional states (such as sadness, fear, etc.) involve a signature pattern of ANS activation, which he referred to as emotions that “have a discrete bodily expression” (James 188-205). Researchers have had mixed results with this theory. In a large meta-analysis covering 37 different ANS measures, only a small number were found to provide specific responses to discrete emotions (Cacioppo et al.). As an example, heart rate is increased for both fear and anger, so differentiating the emotion is impossible with one measure alone. However, accuracy in identifying discrete emotions may increase with the layering of multiple physiological measures (Mauss and Robinson 5). Additionally, we must consider the role of individual differences in emotional response. Rottenberg, Ray and Gross point out that individual differences “influence emotion generation at every stage in the process” and include variables such as dispositional mood, emotional reactivity, emotion regulation styles, personality traits, physical health status, and other characteristics such as “gender, race, class, and culture” (11).

A variety of methods of measuring emotional response exist, each with strengths and challenges (Balters and Steinert 1585). For example, the self-report method is inexpensive to administer, does not need high technical knowledge, and allows participants to share how they are feeling about an experience in their own words. However, if time elapses between the stimulus and the self-report, emotions reported may fade or be distorted via errors or biases in

recall (Levenson 36). The measurement of physiological signals allows for continuous monitoring of autonomic nervous system response, at the expense of the ability to link specific ANS responses to specific emotions (for example, an increased heart rate may be due to fear, anger, or happiness). As I will demonstrate, a mixed methods approach combining physiological measurement of emotional response with self-reporting overcomes weaknesses from each individual method and strengthens the resulting data.

Challenges in measuring physiological response

When measuring emotional response, several concerns must be considered and corrected. One is the observer effect: the act of measuring emotion may influence the emotion itself -- to measure tire pressure, one must interact with, and remove air from, the tire. Rottenberg, Ray and Gross suggest that decisions on methods to assess emotional experience require researchers to "balance the desire for valid and perhaps even continuous emotion experience reports against the competing desire not to interfere with emotional responding […]" (13).

Another concern is the massive amount of data that studies of physiological response to emotional often generate. For example, sensor equipment such as the Empatica E4 wristband record physiological data at up to 64 data points per second ("Empatica E4 Sensors"). Such data rates can quickly generate massive datasets that hit limits put in place by some software packages, such as Microsoft Excel (Jacobs 36-44). To address this issue, researchers often average together responses to look for trends, and, with emotions often existing for a brief time of between .5 and 4 seconds (Ekman 332), there is a risk that this averaging process will be

"watered down" by data related to periods of time where no emotional response was observed (Rottenberg, Ray and Gross 14).

While the measurement of physiological signals has become far easier due to the miniaturized technology, unchanged is the need for verification of the subjective emotion felt by the participant. Wallbott and Klaus clarify:

> Although in principle we can measure the objective underpinnings of emotional experience as far as physiological changes and expressive behaviours are concerned, the self-report is our only access to motivational changes and action tendencies as well as the subjective feeling state (57).

Other challenges to gathering accurate data include the idea of person specificity, or the individual differences in emotional response, which may be connected to individual factors such as age, gender, and intelligence (Wallbott & Scherer 59), and the fact that individuals often attempt to mask their feelings from others, and to adapt emotional expression to the expectations of those who are present. Ekman calls this phenomenon "display rules" (Ekman).

Thus, there is as of yet no "magic bullet" to measuring emotions physiologically, as the inaccuracy of lie-detection devices such as the polygraph machine have shown in their attempted use in the courtroom (Faigman, Fienberg and Stern). While it may be possible to infer an emotional state from trends seen in physiological data, currently only with an introspective self-report from the experiencing subject can we confirm the accuracy of the emotions felt.

New technology options for collecting physiological data

With the advances in miniaturization of technology in recent years, it is now feasible to bring the technology of the psychology research lab into the theatre venue. The “quantified self” movement is a recent consumer technology trend which allows people to use a variety of wearable devices to track physiological responses (Know Thyself: Tracking Every Facet of Life). With the launch of the movement, innovation and marketing competition has drastically reduced the cost of devices. Access to devices that measure heart rate, galvanic skin response, brain waves, perspiration, facial expression, respiration, pupillary response and more which used to cost tens of thousands of dollars can now be acquired for much less. Many consumer-grade devices exist, and each of these devices provides different advantages and obstacles. As an example, the trend for counting “steps” as a measurement for the recommended amount of daily exercise has increased in popularity in recent years, with many options for step counters available in the market (Eaton). Specialized wearable devices are available for athletes that track respiration, heart rate variability, blood pressure, oxygen saturation of the blood, and more. Fewer devices that measure and report on specific stress levels and felt emotions are available, but the number of options is expanding. One such device is the “Feel Band,” which measures galvanic skin response, blood volume pulse, and skin temperature and uses “proprietary algorithms to translate those bio-signals into emotions” ("Feel”). The company Emotive also has a product called “Insight” that is a 5-channel prosumer electroencephalogram (EEG) headset system, which reports to measure the four major frequencies of brainwaves and analyse the wearer’s state in several areas, including arousal, interest, stress, and boredom ("Advanced EEG Technology - Backed By Science”). In Appendix 2, I have reviewed available consumer-based wearable devices, identified 31 products, and listed current pricing and web link information. Given the wealth of options of wearable physiology measurement devices available in the

market, it is important to further filter these products by their individual appropriateness for use in a theatre venue, however I have provided this list as a starting point for theatre leaders planning future research.

Appropriate Physiological Channels for the Theatre

As I have described, the value of the self-report method of determining a person's emotional state by asking them to put their feeling into their own words is unquestioned. However, a problem occurs when two people both report that they are feeling, for example, "very happy". Are they both feeling the same amount happiness? And how would we test this? Unfortunately, as we have seen, not only do the many languages of the planet define emotion in different and complex ways, but even selecting one language does not provide the nuance of levels of magnitude that a more quantitative approach provides. Plutchik defines measurement as:

> […] the assignment of numbers to objects or events according to certain rules […] generality exists because the very same kinds of numbers are used to represent the magnitudes of very different kinds of events […] numbers thus provide a kind of universal language for describing continually changing events (Plutchik and Kellerman 2).

While theatre companies will no doubt continue use of the self-report method, I suggest that it be augmented by adding the measurement of physiological response. This mixed method, as I will show, allows the actual emotion being felt to be captured via self-report, with the magnitude of that emotion captured by physiological data, which can then be compared between participants -- the use of both methods strengthens the end result for both methods.

As I will introduce via a new framework in Chapter 5, when evaluating equipment for measuring physiological data in the theatre, several considerations must take place, and many types of measurement equipment are not appropriate. For example, pupil response would be a poor measure in a theatre venue, as seats are usually in the dark and visual measurement equipment might obstruct the view of the performance. For my exploratory study, I selected the measures of skin conductance, heart rate, and skin temperature, which all work well in a theatre venue, and which are all commonly used ANS measures with a large volume of completed studies supporting their use (Mauss and Robinson 3). As I will show, these three measures, combined in a mixed methods approach with a self-report and post-performance interview, provide new insights on audience emotional reactions to the surprise climax of a theatre performance.

Skin Conductance

Skin Conductance, also known as Galvanic Skin Response or GSR, works by measuring the level of skin conductance between two metal electrodes placed on the skin. A constant low voltage is applied between the two sensors, and as sweat level increases or decreases due to the sympathetic nervous system's reaction to an emotional stimulus, the conductivity of the skin changes and can be measured via a waveform. This bodily response was discovered by Féré and Tarchanoff (working separately) in 1888 and 1890 respectively (Boucsein 4). Its ease of use and flexibility in a variety of settings has influenced it becoming "one of the most widely used … response systems in the history of psychophysiology" (7). Equipment used to measure GSR is inexpensive, requiring only the two electrodes, an amplifier to boost the signal amplitude, a digitizer to convert the analogue signal into digital data that can be displayed on a computer, and

in some models a wireless option such as Bluetooth so that data can be streamed to a monitor in real time.

As Braithwaite et al. describe, the GSR signal is measured in two parts: the tonic level/skin conductance level, or SCL, and the phasic response/skin conductance response or SCR. A person's tonic level slowly and steadily changes over time, based on factors such as hydration and skin dryness. In GSR, the phasic response is the most important measurement, as it changes quickly based on emotional stimulus, usually within 1 to 5 seconds after the onset of the stimulus. When analysing GSR signals, the waveform can be broken into four sections. Latency is the duration from the stimulus onset to the onset of the phasic burst, which usually happens in 1 to 5 seconds. The peak amplitude is the highest point that the conductivity was as compared to the onset. The rise time is the direction of time from offset to peak. Finally, the recovery time is the duration of time from the peak to the return to the offset. GSR is measured in samples per second (Hz). Since GSR equipment can measure many more samples per second than are needed for most applications, often data is downsampled or averaged to make it easier to manipulate.

It is important to note that GSR measurements only indicate than an emotion is being felt, not that the emotion has a positive or negative valence. Because of the need to understand the specific emotions being felt at a given point in the play, the readings from GSR will be used to question participants about the emotions they felt at specific times. This mixed-methods approach will result in more accurate results than if just one method was used.

Heart Rate

The heart is a vital organ involved in every system of the body that reacts to both internal and external stimuli. Through vasoconstriction and vasodilation, blood is concentrated in various

areas of the body based on need, such as the redirection of oxygenated blood from the digestion system to the legs in response to strong emotions felt such as fear (Stern, Ray and Quigley 179). Heart rate has been shown to increase for the emotions of anger and fear, be an accurate reflection of the state of arousal of the subject (Azarbarzin et al. 645-653) and has been shown to differ for emotions being experienced (for example, heart rate has been found to increase during anger, fear, and sadness (Larsen et al. 180).

Temperature

Research has shown that skin temperature changes based on stress. Arousal causes the constriction of blood vessels, reducing the amount of warm blood reaching the skin on the peripheral parts of the body, resulting in a rapid loss of skin temperature (Herborn et al. 225-230). Physiological response to emotion is influenced by context. Lang et al. found that the emotion of fear can illicit different physiological responses, such as freezing in place, vigilance, or flight. For example, preparing to flee requires blood flow to be increased to the legs, which may change the measurement of the physiological response. Additionally, a variety of other factors may influence skin temperature readings, such "ambient temperature, physical activity, or by age, sex, race, or body mass index" (Doberenz et al. 87-95)

The Future: Facial Expression Analysis

The face evolved as an incredibly nuanced tool to communicate one's intentions to others in social situations (Schmidt 3), and it continues to be an important part of social interactions

today. Imagine a human ancestor running towards his tribe with the expression of fear on his face; in the case of an attack by a large predator, understanding such a facial display could mean the difference between life and death. As a modern example, showing the facial expression of anger may cause fear in others, and showing the expression of happiness may aid in establishing trust. Researchers have catalogued more than 10,000 human facial expressions, made up of 43 different individual facial muscles, and the ability to understand facial expressions is an important part of many roles in society, including judges, police officers, and airport security (Duenwald). However, one of the challenges to using facial expressions to identify emotion is that, with this complexity of the face, objectively deciding the amount of an emotion being felt is difficult. Emotion is difficult to describe in words because the interpretation of finer details of the emotional display are subjective, due to factors such as what is "normal" for an individual, and the intensity and amount of emotional display. To overcome these obstacles, Ekman and Friesen chose to focus on the movements of the muscles of the face, and created the Facial Action Coding System, also known as "FACS" (Ekman and Friesen) which allows an observer to apply numerical values to the amount of muscle movement, so that different facial expressions can be coded and verified objectively, described as "action units" or "AUs" ("Facial Action Coding System"). Each muscle of the face is assigned an AU number, and when movement of that muscle is observed, the intensity of the moment is measured using letters A through E (A being only a slight movement, to E being the maximum amount of movement possible) (Coan and Allen 211). While the FACS is a useful system, the complexity of coding each muscle movement of the face means that coding time can be extensive, with a minute of video taking approximately 2 hours for humans trained in FACS to code (Calder 492). Given the need to code potential hours of video (for example, during interviews of crime suspects) researchers have

turned to computers to analyse videos for facial expressions. Utilizing cameras, facial recognition software measures the unique characteristics of each person's face (such as the distance of one eye from the other, distance from the eye to the nose, etc.) to measure movement of muscles into recognized facial expressions of emotion. Systems have progressed to such a degree that real-time identification of facial expressions is now possible (Wolf 457) and is now in use for marketing and advertising (Davies) and border security ("What Is The Face Recognition Technology Used In Arrivals Smartgate?"). Companies such as Affectiva ("Emotion Recognition Software And Analysis - Affectiva") and Noldus ("Noldus") now offer access to the use of their software for use in academic and commercial settings.

To date, only one example of a theatre company conducting facial expression analysis of audience members can be found. In an innovative response to a leisure tax increase on performing arts tickets in Spain, The Teatreneu Club, a comedy venue in Barcelona, made all tickets "free" and instead charged people €.30 per laugh, measured by analysing facial expressions captured via camera mounted on the back of each seat (Logan). Results of the experiment were positive, with the amount received per ticket up by €6 over previous "normal" ticket prices (Wakefield). Facial expression analysis in a theatre venue offers many intriguing advantages. Audience members can share emotions without answering surveys. Resulting data can be viewed in real time. And because facial expressions of emotions are universal, barriers to participation are reduced. However, facial expression analysis also presents several possible problems. One, audience members may avoid a theatrical performance if they know they are going to be watched. In America, people being observed on closed-circuit video cameras have shown a mixed response, with many wary of being recorded and mentioning privacy concerns (Neary). Permission to be observed while watching a theatrical performance would need to be

given by any audience member participating in a study. Two, audience members who do attend might become preoccupied with the idea that they are being watched, distracting them from the play and the performers. No known research has been done studying the effect of mental states of audience members prior to seeing a theatre performance, but it is known that people who are stressed show lower capabilities to feel empathy (Sapolsky), and for many, empathy with the characters is an important part of attending theatre. Also, many people seek theatrical experiences to "escape from the real world" (Walmsley 335-351) and the knowledge that a camera was watching them could take people out of the moment. Three, while it is difficult for most people to control the physiological responses of their autonomous nervous system (i.e. respiration rate, heart rate, etc.) it is quite easy for people to control their facial expressions on command (Elfenbein, Marsh and Ambady) as is seen by card players who deliberately play with a "poker face," consciously hiding their facial expression as to not give away information about their cards. Finally, theatre productions often dim the lights in the audience during the performance, and computer-based facial detection systems struggle to perform well in low-light situations (Ma and Mohamed).

While facial expression analysis has a strong backing in the literature and is increasingly possible with technology, it is not yet practical for use in understanding audience emotional states in a theatre performance. I include it here as an investment in future thinking: if the obstacles I describe are overcome (such as facial recognition system using infrared cameras usable in a darkened theatre venue) then facial recognition may become a viable, automated way to experiment with emotion capture over the full length of a performance.

Conclusion

Theatre companies have always been able to ask audience members how they are feeling. However, I have shown that there is a new level of sophistication available, powered by affordable physiological equipment previously unavailable for use in the theatre venue. While history shows that psychology researchers have argued about the definition of emotions for centuries, there is agreement that emotions manifest themselves physiologically, and those changes in the body can be measured with a variety of tools, such as skin conductance, heart rate, and skin temperature. As technology is constantly advancing, measurement equipment is likely to become increasingly feasible for use in theatrical spaces.

With the recent increase of access to equipment that accurately measures physiological changes, experiments in theatre have begun. But to date, the numbers of studies completed has been small. Although useful information has been gathered, a number of studies also use methodologies that, in my opinion, negatively impact the overall theatre experience. It is my belief that research that "does no harm" to the theatre experience is not only possible but is a necessity. In the next chapter, I share a literature review of studies that have used physiological measurement in a theatre environment and categorize the results into four core themes. I share my thoughts on how these studies have approached their research questions, identify gaps in the literature, and suggest a new framework for those considering experimenting with physiological measurement in the theatre. Finally, utilising the framework, I share my plan for using past studies to inform the design of a mixed-methods study of audience emotional response to the climax of a play.

4: The Measurement of Physiological Signals of Emotion in the Theatre: A Review of Studies

> "A stage play ought to be the point of intersection between the visible and invisible worlds, or, in other words, the display, the manifestation of the hidden."
>
> *-Arthur Adamov*

In science, the "observer effect" theorizes that particles in motion behave differently if they are being observed (Baclawski). I have shown how emotions manifest in physiological changes in the body, and that those changes can be measured via several physiological channels. Extending this theory to the theatre experience, how does observing audience member physiological and emotional data affect said data? The aim of this chapter is to review the studies on physiological measurement in a theatre that have been completed to date, explore the strengths and weakness in their methodologies, and utilise this information in the design for an original study. To this end, I share research done into the accuracy of wearable technology and argue the benefits of a mixed method approach. Finally, I outline the need for a new experiment with live audiences, measuring emotional reactions to the emotional climax of a play.

Theatre, along with other cultural activities, is estimated to contribute £27 billion to the U.K. economy each year (Laban). Patrons report that one of the primary reasons they attend live

theatre experiences is “to be emotionally moved” (Brown and Ratzkin 4). People who attend theatre show increased tolerance and acceptance of diverse people and ideas, as well as increased empathy (Greene et al.). How is it then that so little research has been done measuring the emotional response of theatre audiences? Given theatre’s social importance, a more developed understanding of how audiences respond emotionally to live theatre may shed light on ways people use theatre to build social relationships, provide an outlet for creativity, and cope with difficult life experiences. Along with these benefits, additional understanding of how audiences react emotionally to theatre may benefit marketing, loyalty, and engagement strategies, resulting in an economic improvement for theatre companies via increased attendance. While researchers have been studying emotional response for decades in other fields (Ekman, Cacioppo et al., Lazarus) researchers are only beginning to understand how audience members react emotionally to live theatre events.

Although it is common practice for theatre companies to survey audience members after attending a performance, in my professional experience, surprisingly few ask questions related to emotions. When this does happen, audience members are often asked to rate their level of agreement or disagreement with a statement such as “The performance was moving.” ("Melbourne Playback Theatre Survey"). Questions such as these ask the audience member to mentally sum up and report on their whole emotional experience from the start of the play to the end and do not accurately capture the details of what emotions were felt over the length of the performance, and why. Additionally, this method may be biased towards the emotions the audience member most recently felt, or those emotions that were felt most strongly at any time during the performance (Latulipe et al. 1847). A deeper understanding of audience member emotional response would be gained by measuring the emotions that an audience member feels

while they are watching a theatre performance. This allows for direct comparisons between emotional responses and specific plot points, and could be shared back with audience members, allowing them to reflect on why they felt specific emotions at specific plot points.

Based in part on the limitations of post-event surveys, there has been a growing interest in alternative methods of measuring theatre audience emotional responses, such as the measuring of physiological signals of emotion (Akhtar). The continued miniaturization of technology is now allowing research that was once confined to a laboratory to be moved into the theatre venue. For example, skin conductance can now be measured using two portable skin sensors connected to an iPhone ("Mindfield Biosystems Ltd."), wristbands are now available that measure heart rate variability, galvanic skin response, skin temperature and more ("E4 EDA/GSR Sensor"), and consumer-level headsets that measure brainwaves via electroencephalography can be purchased for under $300 USD ("EMOTIV Insight Brainwear"). A variety of studies covering the measurement of emotion in other arts genres (for example: music, film, etc.) were found, but excluded if they did not have a connection to theatre or were not performed in a theatre venue setting. In the end, 14 studies were kept to explore for this review.

Name	Year
Ayata et al.	2017
Benovoy et al.	2008
Geelhoed et al.	2014
Martella et al.	2015
Röggla et al.	2015
Rostami et al.	2017
Stern and Lewis	1968
Wang et al.	2013
Wang and Cesar	2014
Wang et al.	2016a
Wang et al.	2016b
Wang and Cesar	2017
Wieland et al.	2016
Wu et al.	2016

Fig. 2: Selected studies for review

Researcher motivations

Researchers studying physiological signals of emotion in the theatre are motivated for a variety of reasons. I have categorized the selected studies into four core areas:

- Core 1: Measuring connections between actors and audience members during a performance (including ways for remote audiences to have more meaningful experiences, and alternative ways for audiences to provide feedback on an actor's performance),
- Core 2: Measuring the emotions experienced by actors during a performance,
- Core 3: Measuring audience responses to a theatre piece as part of artistic feedback or to be used to create more relevant marketing, and
- Core 4: Exploring ways that an audience might be able to co-create the theatre experience via their biometric signals.

Core 1: Measuring connections between actors and audience members

One focus seen was the desire to create stronger connections between theatre audiences and actors. Two research teams explored this idea in the context of remote audiences watching a live theatre experience being streamed at another location. The first ran experiments that included "networked theatre plays" featuring remote audiences (actors and audience in a venue, with additional audiences watching remotely via a live stream) and distributed audiences (two sets of actors and audience in different locations, connected via shared video, producing one

combined theatre performance (Geelhoed et al. 5573-5606). In an attempt to overcome challenges that remote audiences face (such as the inability for applause from the remote audience to be heard by the actors), the authors describe an experimental performance of William Shakespeare's *The Tempest* that was live streamed to a remote audience utilizing a technology called VConnect. In partnership with the Bristol Old Vic theatre, and with support from NESTA, numerous tests were carried out prior to the main experiment, including tests of galvanic skin response in remote audiences. This streamed performance involved high production values (multiple camera angles and live switching based on a scripted presentation to the remote audience). Some problems were encountered, including difficulties with the two-way audio. As part of the feedback process, audiences were asked to fill out a survey after the show. Survey responses showed that audiences who were in the same room as the actors generated a 30% higher arousal than audiences that were watching remotely. The survey asked respondents to rate "overall, how much did you enjoy the performance?" and provided an option for commenting (24). This self-report method is a good example of a low-tech way of gathering audience feedback. However, it focused on overall enjoyment rather than asking about specific emotions felt at different points in the story. This is a fascinating exploration of the potential for remote collaboration in theatre programming, and the authors' introduction of a new model for understanding the audience experience of remote audiences is certain to be useful to those programming remote experiences. However, the implications may not be useful to those producing more traditional theatre experiences.

In contrast to these findings, the second team found that the physiological responses of a remote audience are not much different from those of a live audience watching the same play (Wang et al.). The study measured 24 participants (12 were remote) and captured information

using galvanic skin response, video cameras, and post-event surveys to measure arousal and engagement. Audience response as measured via galvanic skin response was found to be similar in both audiences, but different parts of the play engaged each audience differently. For example, the remote audience was more aroused during a singing part of the script, and the live audience was more aroused at a point where the actor interacted directly with the audience members, as well as when one of the scenes included a smoke effect. It may be that the live audience responded more to the triggering of other senses (such as the smell of the smoke, which the remote audience could not smell). With the success of passive remote viewing of live performance (such as opera performances from The Metropolitan Opera live streamed into local cinema venues), it seems that remotely viewed performances that feature some level of interactivity between actor and audience have the potential for even stronger emotional experiences. Although the focus of this study was on understanding the experience of remote theatre audiences, the information learned from the measurement of physiological response data is useful to any researcher planning emotional experiments in the theatre. The authors mention that when the projectors for the remote audience failed, the remote audience members showed increased galvanic skin response. The authors do not mention if this increased arousal was controlled for in the results.

Another area of interest is allowing audiences to provide additional feedback to actors beyond the accepted norms such as applause, whistling, etc. Wu, Chen and Huang describe a proof of concept of a wearable bracelet to monitor galvanic skin response in a theatre venue, so that real-time feedback can be given to actors during a performance (2). After recording the galvanic skin response of audience members watching a play, the data were averaged, and sent to a projector that then adjusted the colour of a background screen placed behind the actors. When

audience members showed arousal via the worn sensor, the background would move toward white. At times when the audience was not aroused, the background would change colour towards black. Actors and audience members alike were expected to monitor the colour of the background screen to understand the audience's level of arousal. This novel approach is complicated by the fact that arousal is associated with many emotions, including those felt when technology fails. The authors acknowledge the challenges of measuring audiences without disturbing the regular experience of the show, describing the equipment used as wristbands with leads attached to two fingers of the participant. Finger movement, the unusual sensation of wearing finger leads, and the changing colours of the background app all risk distracting both actor and audience member. The authors state that "emotional responses cannot be conveyed to the performer." While this is true from a technology sense, actors often speak of being able to "read" an audience and sense the level of interest and engagement. Heim calls this concept an "energy exchange" between performer and audience member, and that actors are dependent on audiences sharing this "energy" back to them (151). It is possible that actors might be able to be trained to absorb feedback based on technology such as this, but it is also possible that the attention spent could negatively influence this exchange of energy between actor and audience member.

Core 2: Measuring emotions experienced by actors

In another study actors were connected to galvanic skin response (GSR) devices and asked to try to call up emotions that would move the needle on the GSR device (Stern and Lewis 294-299). Actors who were trained in Stanislavski's "Method" acting style of calling up past

emotional experiences to portray fictional emotion onstage were better able to control their GSR measurements (likely their emotions) than actors not using this acting style, or regular college students, compared to readings taken during 10-minute baseline “rest” periods. Additionally, a post-experiment survey was given to all participants, asking how each person responded physiologically to stress. Those who answered "sweating" were also found to be better able to control their GSR. This study supports the use of GSR as a fascinating way of measuring response of actors but has not been repeated on expanded since it was completed. And yet, actors are likely to want to use every technique available to them to maximize their ability to accurately present emotions, and physiological measurement seems to offer an easy feedback mechanism.

Core 3: Measuring for marketing and/or audience feedback on the art

With obvious links to generating revenue, a substantial area of interest is audience physiological response as it relates to marketing theatre. Every theatre company wants to successfully predict what audiences want to see and are willing to pay for. Although focusing on the performing arts in general and not theatre specifically, a paper by Latulipe et al. is widely cited. The research focused on understanding the levels of interest that cultural critics would have in seeing biometric arousal data from audiences engaging with the art the experts created, and how these data would be measured, interpreted, and applied. The authors assert that defining engagement is an important first step of choosing how it will be measured, and that there are differences between how the performance makes a person feel versus how much they like the performance. The authors conclude that measuring of an emotion as positive or negative (or identifying a specific emotion) is considerably more complicated than simply measuring arousal

(1847). This ties into an ongoing debate in psychology on emotion specificity, or the theory that each distinct emotion has a pattern or signature of physiological response, which can be used to identify the emotion. While many psychologists support the concept, Cacioppo et al. researched past studies and found few identifiable patterns of autonomic nervous system (ANS) response that accurately reflected an emotion. Others have theorized that perhaps by laying more ANS measures together, such patterns will be identified (Mauss and Robinson).

In the first of two follow-up studies, the authors studied how experts in the field (choreographers and theatre directors) would use biometric data if given access to it. These choreographers and theatre directors were asked to watch a video of a dance performance or a theatre scene respectively. The videos also displayed galvanic skin response data of audience members, so that response could be visually linked with specific parts of the performance. One expert mentioned that he would use these data to try to figure out what he could do to the scene to make it more interesting (Latulipe et al. 1850). While the participation of a small number of directors and choreographers is not representative of the creative industry as a whole, it is encouraging that physiological response data was seen to have value, which is an argument for additional research to be undertaken.

In the second study, Latulipe et al. recruited 49 participants to watch an 11-minute dance performance video, measured via galvanic skin response as well as a self-report "sliding switch" device that allowed participants to report that they were either feeling "No Engagement" or "High Engagement." Participants found this confusing, and two new sets of labels were created: "Love it!" and "Hate it," and "No Emotion" and "High Emotion" with a neutral option between the two. Participants were then shown their biometric data and questioned about why they felt they responded the way they did to specific aspects of the performance. These responses were

shared with the choreographers and directors from the initial exploration, and although they previously had said they were not interested in these data, they were now curious. One choreographer said:

> I think having access to a graph of valence, it would be like a guilty pleasure for me to look at. [...] It would be like, do people like me? Do people like my work? But I would know, as an artist, that's not interesting.

Another expert commented that he could see producers using tools such as these to hire/fire performers based on audience response. The authors specifically call out that there is a danger to "second-by-second analysis" of audience biometric response data as it relates to specific aspects of a performance, with one theatre director saying: "I could literally make a play where people are talking in whispers and screaming every other sentence - technically, vocally manipulate them... to keep the response constantly on an up level." Participants were asked to move a slider to rate their level of emotional reaction, and one of the participants said, of the slider, *"I left it in the middle because I didn't know what to feel."* This suggests several areas of interest. Are there times during a performance when an audience member is not feeling anything? Does thinking about what they are feeling (or should be feeling) influence what they are feeling? Does thinking about moving a lever to respond to the question take them out of the theatrical experience? There does not seem to be research being done to answer these questions. If the theatrical experience is the most important factor, steps should be taken to respect the journey actor and audience go on together, and any equipment used to measure physiological response should be as unobtrusive as possible.

This study underscores the need for measurement devices to have as small a cognitive footprint on how the audience member connects with the play. By utilizing a wristband-based

measurement device and shifting the mentally intensive parts of self-report feedback to post-performance interviews, my research design minimizes the chance of technology influencing the audience member's experience.

How might the use of these types of devices influence the theatrical creative process.? Many would likely argue that using physiological signals of emotion from audience members to guide the creation of theatre experiences presents risk. We have seen that social media algorithms restrict the showing of content to that which gets the most engagement on the platform. What would theatre, designed strictly for engagement, look like? Theatre is a flexible medium. Theatre created based on physiological signals of emotion may be a new and different form of theatre. One reason for theatre's sustainability is that it has reinvented itself throughout the ages, due to societal, environmental, and aesthetic factors.

Röggla, Wang and César describe a tool they created that allows theatre directors to watch a recording of a play and see how audiences responded via physiological sensors. The authors state that theatre directors find interpreting raw physiological data (such as GSR) difficult, and to overcome this, have built a web-based platform that displays a recording of the performance along with the ability for a theatre director to view audience physiological response. The responses can be annotated, and the play can be explored from different camera angles. While not clear, it appears that the recordings of the GSR data were conducted on real audiences in the theatre venue, and then that data were imported into the web-based tool later for review. This is an interesting method of exploring audience response, similar to methods that have been used in other media such as advertising and television (Morris and McMullen 175-180). An idea not addressed in this study is how access to the data might impact the role of the artistic director of a theatre company, or the director of a specific show. While these technologies show promise

in areas such as the testing of new plays, there are also potential drawbacks. For example, instead of relying on the artistry that directors bring to crafting fine performances, financial backers might require audience feedback tools such as these to hone a performance to such a degree that the artistry itself is minimized. It can be said that part of the benefit of theatre is exposure to new ideas and perspectives, and this needs to be considered in understanding the usefulness of physiological feedback to avoid the risk that theatre producers only give audiences what they say they want. The authors do not mention that any baseline GSR readings of audience members were taken. Gathering baseline is important; Wilder's law of initial values says that higher the initial baseline values, the lower the response (Wilder). Audience members might come into a theatre space being angry or stressed or incredibly happy. They may have recently had coffee or skipped eating all day. These, and many other factors might influence their physiological readings. Baseline readings can be gathered in as little as 2 to 4 minutes prior to experimentation (Braithwaite et al.)

Also, there is no known "norm" for audience arousal. Different people may respond differently to stimuli, and gathering baseline information is an important step that is not mentioned in several studies. It may be that the research, in its infancy in a theatre venue, has not yet established best practices around gathering audience physiological data, and that existing studies are exploratory, on the road to such best practices.

While other studies have focused on reading the physiological data from individuals, one study attempted to read a large crowd of people, using a custom-built open-source GSR system and hand sensors, with a goal of measuring 30-100 people at a time while they watched a touring production of *War Horse* in China (Wang and Cesar 336). The authors suggest that understanding audience reception of artistic works has a lot of benefits, including allowing

artistic creators to make changes in the art or the marketing of the art based on audience feedback. For example, the research was completed with the cooperation of the Chinese cultural organization putting on the show, as the artistic staff considered changing parts of the show based on audience feedback. They were also interested in the potential of using the sensor network to do different types of plays — for example, ones where the audience response influences the outcome of the story. The authors decided to avoid commercial sensors due to cost, and to build their own sensor system and network capability. They do not discuss any comparisons of their bespoke equipment to professional physiological measurement devices, which would establish additional data credibility. Interesting aspects of this study include the creation of sensors for children to wear on their wrists, and an exploration of gender differences and emotional arousal (women were more interested in the emotional scenes, and men more interested in the action scenes.) Finally, they invited critics (such as newspaper journalists) to interpret the results, and these critics agreed that access to these types of data would help them in, for example, writing reviews about the play (9). This is refreshing research. While there is obviously a revenue-generating motive, the researchers also seem to have built in research questions that are not directly related to revenue. Funders should seek out and financially support these exploratory studies as they contribute rich additional data in support of new study design.

Core 4: Measuring to co-create theatre pieces

Researchers are also beginning to explore the idea of using physiological response of audience members to allow them to co-create and/or control aspects of a theatre piece, via direct interaction. While not a research study, Rostami, et al. (197–208) carried out two workshops that

explored different ways to bring biosensor data into interactive theatre experiences. Actors and human-computer interaction specialists were gathered for both workshops, and ideation sessions took place. Several ideas emerged, such as reading an audience member's physiological responses until a certain threshold is reached (either predetermined or interpreted in real time by an artistic staff member), and only then allowing the plot of the play to move forward. The authors give an example of an extensive argument between onstage characters, increasing in intensity, until sensors measured that the heart rate of the audience members had reached a certain threshold, and then the scene would change. In another concept, audience members would wear VR headsets and experience individual versions of the play, with elements only appearing to that audience member when s/he reaches a specific physiological state (with the potential other audience members to see different results based on their respective physiological states). The authors also mention the idea of "temporality" or the time it takes from the sensory input to be received before the resulting action takes place. Normally this is instant (such as hitting a key on the keyboard, and seeing the letter appear) but using technology, could be extended. For example, audience members might be required to stand in a specific area of the city, and wait until their heart rate slowed down for a predetermined period of time before the story would automatically proceed. While this study explores concepts at this stage, these ideas represent new and engaging ways of experiencing, and creating live theatre.

Trends in measurement methodology

Although physiological signals of emotion can be measured by a variety of devices, researchers have almost exclusively selected skin conductance/galvanic skin response devices

(GSR) to measure physiological signals in the theatre venue (Wu, Chen and Huang, Benovoy, Mitchel, et al., Röggla, Wang and César, Rostami et al). GSR is a low-cost method to capture physiological signals. Emotional arousal induces a sweat reaction, which is particularly prevalent at the surface of the hands and fingers due to concentrated sweat glands in these areas. On arousal, the amount of salt in the skin increases via sweat, which increases electrical resistance. This can be measured via electrodes attached to the skin. Low cost, ease of use, and ease of data capture are all contributors to the widespread use of GSR in experimentation. Using GSR devices in the theatre venue seems advantageous due its ability to be used during a performance with minimal disruption to the performance. With recent advances in technology, GSR-based measurement tools continue to be miniaturized and several options are now available that are worn on the wrist.

GSR devices have advanced in recent years, however, the data provided from them still requires interpretation. Several researchers added post-experience surveying or interviews to their GSR measurements (Geelhoed et al., Wieland et al., Stern and Lewis, Wang et al., Latulipe et al.). Surveying is the traditional method for measuring theatre audience emotional response, and there is much written on the subject. On its own, a survey is limited by the questions asked and the availability of open-ended responses. Additionally, participants answering a survey after the performance may be subject to the "peak-end effect" which shows that “measurements of emotional experience can be strongly influenced by the emotion felt at the end of the experience” (Latulipe et al. 1847) This is a strong argument for the usefulness of gathering and analysing data captured while the subject is watching the play. As I will demonstrate, by conducting a mixed method study, real-time data capture can be combined with a self-report method allowing ongoing physiological data to be captured and mapped to specific emotions. Participants will be

able to be interviewed about specific parts of an experience that result in a spike in physiological response. This allows for questions such as “At the end of act one, your readings increased sharply. What were you feeling then?” This ability to remind the participant about specific emotional triggers also has the potential for a variety of interesting benefits, such as the ability for the participant to explore personal feelings, make greater meaning of the work, and relive the pleasure of experiencing a strong emotion.

Usage of alternative measurement equipment

One study avoided the use of GSR, instead opting for common sensors available on mobile devices. The authors argue that GSR-based solutions are difficult to implement when the goal is to read a large crowd, and that pervasive sensors readily available in mobile devices show that increased bodily movement is correlated with increased “enjoyment, immersion, willingness to recommend the event to others, and change in mood” relating to the experience (Claudio et al. 201). Although there is an obvious benefit to these sensors being widely available in the mobile devices audience members already have with them, separate accelerometer sensors were used for the experiment. The authors discuss potential problems with having audience members use their mobile phone sensors such as participants potentially using their phones during the performance (and thus changing the accelerometer readings). However, they do not explore the difficulty of integrating with the various mobile phone models, privacy of mobile phone data, and the potential for users who are not tech-savvy having a difficult time interacting with the technology. Additionally, accelerometer data may prove to be less of an indicator of emotional response as

other methods as audiences are often stationary while watching, moving rapidly only during applause.

Ethics and Privacy

Although all the studies explored the use of data from physiological sensors, only two studies made any mention of ethics or concerns about the use of these data relating to privacy. Wang et al. state that there is a need for "further understanding of ethical uses". Röggla et al. mention that users of their software were required to enter a password to gain access to user data (749). Rostami et al. calls out the lack of social practices around sharing biometrics" and says: "While we all learn to negotiate our visual privacy around our body and our movements, we do not learn to negotiate the sharing of our GSR…" (7). Although research into measurement of physiological response of audience members is in its infancy, it is surprising that there has not been a more focused effort to consider privacy concerns. Data gathered from individuals could, for example, identify strong feelings for specific political leanings, sexual preferences or desires, or racist tendencies. Tests exist to measure such data, and it may be possible to gather similar data from physiological response to an emotional stimulus seen on stage (Soyyilmaz). As the field of research develops, researchers should consider privacy concerns when designing their experiments or commercial products and protect participants, and their data, from potential abuses.

Measuring arousal vs. Measuring specific emotions

In reviewing these studies, it is important to note that while measuring physiological response captures arousal, it does not specifically capture distinct emotions. The gold standard in this area is the work done by Ekman, who showed that six specific emotions (Happiness, Sadness, Fear, Anger, Surprise and Disgust) can be accurately identified by the movement of muscles in the face when they are felt, and that the facial expressions for these emotions are universal across cultures. Russell pioneered a way of measuring emotional response without using the face that is in wide use today: the circumflex model of affect, which measures emotion on an x/y plane (1164). Arousal/excitement is measured on a scale of high arousal to low arousal and is represented as "x" and valence is measured on a scale of positive affect to negative affect, represented by "y" on the x/y plane. Specific emotions can be mapped to this X/Y plane, for example, anger can be seen to have high arousal, and negative affect, while happiness can be seen as medium arousal, and positive affect. It is important to note that GSR measures the level of arousal in the participant, not the specific emotion felt. Intense anger and intense disgust would likely show similar results in measurement of arousal. Ayata, Yaslan and Kamasak claim to have trained machine learning algorithms to accurately recognize emotions from GSR, but their study does not describe any self-report methodology, so it is unclear how they are determining accuracy of emotions being experienced by the participants.

While GSR has been the methodology selected by many researchers studying physiological arousal in theatre, GSR measurement still presents challenges. The need for physical contact with the participant may influence the data captured, or the interpretations of the results. Current GSR designs favour the placement of sensor pads on two fingers, with wires running into a wrist-based sensor, a configuration that is potentially distracting to the audience member, the actors, and others in the room. New technology has been developed that reads GSR

without the need of finger-based sensors (“Feel”, “Empatica E4”) and by taking measurements from the wrist directly, will replicate the feeling of wearing a watch or a wrist-based exercise tracker, which are sensations many people are used to. Additionally, researchers have a choice in equipment for measuring GSR — they can use off-the-shelf technologies that are available for rent or purchase, or they can create original technology specifically for the research (the approach favoured by several researchers). However, it is important that any custom-made technology be tested against reliable lab equipment, to confirm that equivalent data are captured. In the studies where custom technology was created (Wang & Cesar, Geelhoed et al., Wu, Chen and Huang) only the latter study mentions any testing against reliable laboratory equipment.

Equipment and methodology considerations in the theatre: A new framework

When measuring emotional response in a theatre venue during a performance, several factors must be considered such as respect for the performance itself, the rituals of the experience, and the expectations of everyone in the space. The miniaturization of measurement technology has made many new equipment options available to researchers. After reviewing the literature on previous physiological studies with theatre audiences, several obstacles have surfaced. For example, several studies did not share their data privacy plans. Some studies implemented methods that fundamentally changed the performance experience either for the audience member, the performer, or both. While theatre is an infinitely flexible venue and some will welcome these differences, I believe we must design our research in such a way as to impact the regular attendance experience as little as possible. To that end, a review of the literature failed to find any framework or best practices for capturing physiological data during a theatre

performance. Work by Justin and Zentner comes close, asking important questions to consider when measuring emotion in music performance (3-21). While not the arts, an excellent example comes from performance psychology: Tenenbaum and Filho outline eleven questions that should be asked before conducting research, to increase the trustworthiness of the results (34). Using Tenenbaum and Filho's work as a template, and reviewing methodologies used in previous studies, I have created the following framework to consult before undertaking physiological research during a theatre performance.

Does the proposed research…

- …distract cognitively and/or physically?
- …influence physiologically and/or emotionally?
- …change the perception and/or quality of the performance?
- …restrict portability and/or length of the performance?
- …disrespect cultures, rituals, group dynamics, and individual expectations?
- …fail to follow standard research protocols?
- …fail to plan to protect user data?

Appendix 6 features a worksheet version of this framework usable by any theatre company planning research. Based on results from the worksheet process, potential research designs should be changed to completely eliminate any identified conflicts. If that is not possible, then practitioners are encouraged to use the "potential remedies" column to brainstorm changes to the research design that will reduce the severity of any identified conflicts. Examples are provided. It should be noted that the majority of physiological research in the theatre to date has been conducted with audience members, however, this framework should be considered from the perspective of everyone linked to the performance, including performers, staff members,

volunteers, etc. The framework challenges theatre researchers to consider seven questions on the research design, which I have included below.

Question 1: Does the proposed research distract, cognitively and/or physically?

It can be difficult for audience members to become fully engaged with the story and what is happening with the characters on stage. This engagement is fragile, and easily broken by distraction. As an example, dial testing has been used to measure responses to advertising materials and television shows (What Are Those Squiggly Lines On CNN Telling You?). Using rotating dials, participants give feedback by turning a dial from 1 (not engaged) to 10 (fully engaged). However, it seems that people who are "fully engaged" may forget to turn the dial at all. Thus, any device used for the measurement of emotional response should not require cognitive effort from the audience member.

Similarly, in the distraction-free zone that many theatre venues attempt to institute, the use of technology sometimes creates friction. Several incidents on Broadway have involved angry actors breaking character and chastising audience members for their bad behaviour. As an example, actor Patti LuPone famously stopped a performance of *Gypsy*, turned to an audience member taking pictures on a mobile device, yelling "Stop. Taking. Pictures. RIGHT NOW!" (DivaBehavior). She refused to continue the performance until the offending audience member was removed from the venue. This brings up the important risk of physical distraction. Lights, sound, vibration, or even the physical movements of an audience member interacting with a measurement device have the potential to impact the theatre experience. Performers may be distracted from their performance, influencing the experience. Fellow audience members may be distracted and comment or take other actions that influence the subject's experience. And the subject's own reactions to any physical needs, notifications, or workings of any equipment may influence the experience. The ideal measurement device would be present and observing, but not seen, heard, or experienced at all. While it may not be possible to use a device that is completely invisible to the subject, such a device should impact the user's ongoing experience as little as possible and be easily forgotten.

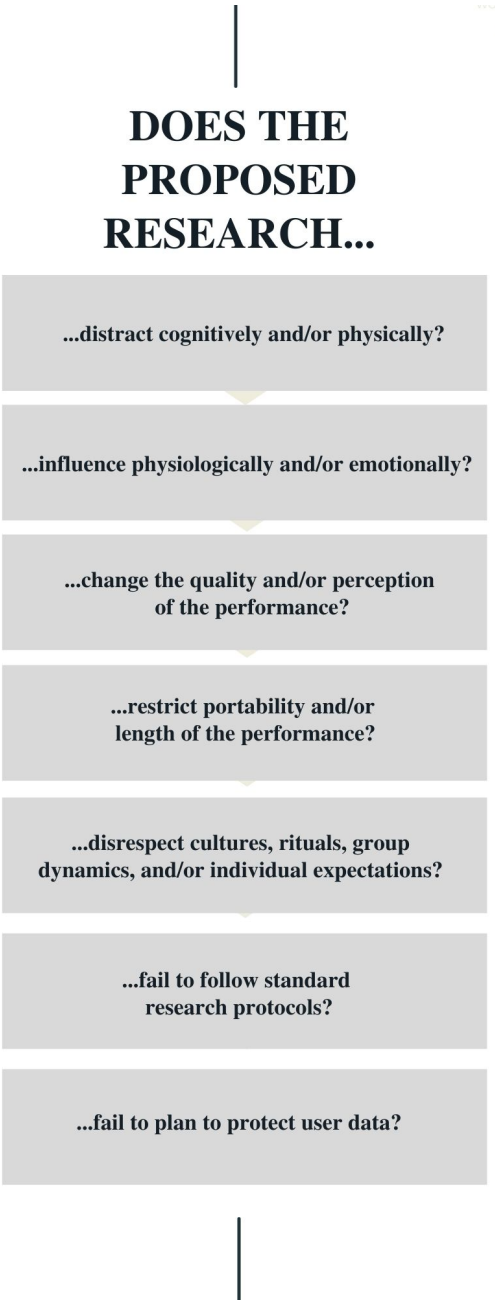

Fig. 3: Seven-step framework for theatre physiological measurement

Question 2: Does the proposed research influence physiologically and/or emotionally?

A band worn across the chest to measure respiration rate may be too tight, or may generate too much heat, making subjects uncomfortable. Sticky pad adhesive may cause skin irritation and could influence data gathered. Any technology used for measuring emotional response should take the comfort and physical characteristics of the subject into consideration, so that the physiological state of the subject is not influenced. Additionally, devices should be able to be used by a wide range of individuals who may have different physical characteristics.

Use of technology to measure emotional response also runs the risk of influencing the emotions being measured. For example, subjects who are wired up to a chair or who are asked to wear a confining device may experience fear of the device itself, which would impact the emotional data gathered. The ideal measurement device or methodology will not impact the emotional experience of the subject and should provide a similar user experience for any participant.

Question 3: Does the proposed research change the perception and/or quality of the performance?

Brown and Novak define the transfer of knowledge, emotion, and experience from the artist to the audience as the "artistic exchange" (Brown and Novak). Although theatre enjoys a long history of variety in artistic exchange, however that exchange occurs, it should not be influenced or be experienced through the filter of any measurement technology. For example,

consider an audience member wearing a virtual reality helmet for measuring eye tracking, asked to watch a play. Unless the artistic creators of the play intend it to be experienced using a virtual reality headset, the use of such a device would fundamentally alter the intended theatrical experience, and should be avoided. The need for unfiltered artistic exchange extends beyond the physical and includes any potential influence over any potential psychological or emotional response of the subject, such as a feeling of empathy with characters in the story.

Question 4: Does the proposed research restrict portability and/or length of the performance?

Physiological measurement equipment should be portable and small enough to allow complete range of movement during a standard theatre performance. Devices that require wiring to the seat are likely impractical; audience members sit, stand up for ovations, and walk around the space before and after the show. These requirements favour wearable measurement devices that are self-powered with a capacity to operate for 4+ hours, and that either broadcast or record data for later download and analysis. The script for a play outlines the successes, challenges, and growth opportunities for the play's characters over time. These moments of story arc create emotions both for the characters, and the audiences watching them; as characters feel emotion, audiences have the opportunity to empathize. Any device for measuring emotion in this context should be able to measure emotional response over time (potentially covering pre-performance, the performance itself, and post-performance reflection). Additionally, while there is no guarantee that an emotion felt by an audience member during a performance was caused by that performance, any device that is attempting to measure emotion should be able to track that emotion against what is happening on stage at any given moment.

Question 5: Does the proposed research respect cultures, rituals, group dynamics, and/or individual expectations?

As I have shown, theatre involves rituals, traditions, and group dynamics that influence the emotional engagement and expectations of audience members. Equipment and methodology should avoid disrupting these key aspects of the attendance experience, or risk changing the data collected. For example, the conversations that happen in the minutes before the performance begins, at the interval, and after the performance are part of the overall emotional engagement; audience members wearing monitoring devices should not be pulled away from their normal experience for things such as downloading data, refitting devices, etc. unless absolutely necessary.

Question 6: Does the proposed research fail to follow standard research protocols?

Although not every theatre company has a trained researcher on staff, effort should still be made to understand general concepts of conducting qualitative and quantitative research. For example, have ethics been considered? Have participants given consent? Are there types of bias at play that must be corrected? Are data privacy policies robust? A variety of online resources and books covering research concepts exist, such as "Basic Research Methods: An Entry Into Social Science Research" (Guthrie). Theatre companies may also wish to explore seeking out individuals with research experience to invite to become board members or advisors, bringing a level of oversight into the research planning process.

Question 7: Does the proposed research fail to plan to protect user data?

Researchers at a university must share their plan for how data will be collected, processed, and disposed of with an ethics department, who must approve the plan in consideration of the rights of the research participants. Theatre leaders in the field have no such ethics oversight, and you must consider these on your own. Have your participants given their permission for their data to be captured? Will you anonymize the data so individuals can't be identified moving forward? Is it possible to share participant data back with the participants respectively? When the research is complete, is there a plan to safely dispose of data? And how might you best communicate these steps to your participants throughout your experiments? Robert Darby provides a good primer for ethical data collection and suggests that "how you handle the information and consent processes may affect your ability to share data later" (Darby).

The Framework in Practical Use in Research Design

After reviewing the existing literature on experiments on physiological measurement of emotion in the theatre, I created a seven-step framework to improve future research. Utilising this framework, I have designed a research study measuring the emotional response of audience members during the climax of a play. This process allowed me to make several changes in my research design to improve over previous studies. For example, my research simplifies the equipment needs by using wearable biometric wristbands, instead of bulkier equipment options used in previous studies. Many people are used to wearing watches, bracelets, and step-counting

wristbands, which ideally allow the participant to forget that they are being measured, minimizing the chance of the technology influencing the audience member's experience. I have also designed a mixed-methods approach to overcome the difficulty in identifying specific emotions from physiological measurements alone. By mapping participant physiological response data to the climax of a play, and by using post-show self-report interviews to help participants recall specific emotions felt during those plot points, the ability to objectively and subjectively measure emotional response becomes possible.

Conclusion

Research to date has demonstrated that there is significant engagement in the measurement and analysis of physiological signals of emotion in theatre audiences, with a variety of goals in mind, including better connections between actors and audiences, measuring emotional response in actors, accurate forecasting of audience response for marketing purposes, and allowing audiences to control aspects of the art itself through their biometric signals. Due to the advancement and miniaturization in technology, tools to measure physiological response that once required a laboratory are now available in devices that audience members can wear. These devices currently only reliably measure physiological arousal, but the ability to accurately identify specific emotions from physiological data alone may be possible and is a goal for researchers. Galvanic skin response (GSR) is the tool most often selected to measure physiological response, due to its proven ability to detect arousal, its low cost, and its small size. There are important concerns in the areas of ethical treatment of personalized information and the potential for audience members to be distracted by research equipment or procedures, and

these concerns should continue to be addressed in future studies, which can now be informed by the use of the provided framework. Opportunity exists to study audience emotions response via a mixed-methods approach (multiple physiological measures with the addition of a self-report and an interview to verify emotions being felt). This may be more accurate method of capturing and exploring emotions felt by theatre audiences.

Armed with an understanding of the history of physiological measurement of emotion, my framework for planning physiological research in a theatre venue, and a list of available equipment, theatre leaders have everything they need to design and implement their own experiments. As proof, I have designed a mixed-methods study of emotional response to a specific plot point in a play, utilising off-the-shelf equipment and data analysis tools. To leave theatre leaders with one key encouragement: if I can do it, so can you.

5. Multi-case Study Approach and Methodology

> "Make them laugh, make them cry, and back to laughter. What do people go to the theatre for? An emotional exercise. I am a servant of the people. I have never forgotten that." – *Mary Pickford*

Lack of exercise is the cause for a variety of illnesses and health problems, and not just physically. In the quote above, Mary Pickford speaks of the importance of theatre as emotional exercise. I believe that as with physical exercise, the more we engage emotionally and empathetically with others, the healthier we mentally become. In the journey of the relationship between emotion and theatre, I have shown how the two have been used to influence audience members to attain political goals, and explored the power of theatre ritual and group interaction, and the valuable benefits they provide. Through an exploration of the literature on physiological research done in the theatre to date, my hope is that leaders at theatre companies around the world understand that now is the time to focus on emotional engagement of audiences, for all the benefits it provides. Physiological measurement of audience emotions is possible using technology and knowledge available right now. As proof, I have designed the following multi-case study to both test my hypotheses about audience emotional engagement during a play, and to show what is possible, especially with limited capacity and a small budget. I encourage theatre leaders to use this method as a jumping-off point, replicating my methods and improving them,

and opening up new directions in exploring the emotional connections our audiences are having with the work.

This chapter is in two sections. Part one is a "field notes" journal on the planning and implementation of the study, including observations on the day of the event that I hope will be useful to theatre leaders planning their own experiments. Part two details the research results from the study and is formatted as an academic paper for upcoming journal submission, outlining the experimental design and tools and equipment used. Throughout, I identify many factors to be considered during the experimental design, such as the need for a play to have expected emotional plot points, the need for equipment that doesn't take the audience member's attention away from the play, etc. I describe the specific play selected (*I and You* by Lauren Gunderson) and outline why this play was selected. I identify the theatre company who agreed to partner with the research and detail the ways the playwright engaged with the process. I describe the selection and make-up of the research participants (including ethical considerations), and the mixed-methods approach I used to collect data. Finally, I report on difficulties and successes that occurred during the research at the performance and identify limitations of the method and dataset. This chapter also reports on the results seen from the physiological data, the self-report questionnaire, and the interviews with playwright Lauren Gunderson, and explores similarities and differences expected and realized (or not) between the three.

Part One: Field notes on emotional response to the U.K. premiere of *I and You*

When choosing a play to study the emotional responses of the audience, the possibilities seem endless. Shakespeare is an obvious choice: ease of access to the material and productions, lack of rights or permissions to be secured, popularity as a focus for research, and a well-known set of stories. And yet, selecting a Shakespeare play for this research would have also introduced challenges. For example, does familiarity with a plot or storyline influence an audience member's emotional response? Do we respond with stronger emotions when we know what is going to happen? Or does this knowledge instead deaden our emotional response? Many audience members have difficulty with understanding Shakespearean dialogue. Does this impact the emotions felt? While these are worthy areas for additional research, exploring them during this study would have added unnecessary complexity to the core question: Do audiences experience heightened emotions during a specific plot point where heighted emotional response is expected by the playwright?

To measure emotional response to a play, the play must generate some level of emotional response in the audience member. As a theatregoer and actor for many years, I have performed in approximately 50 productions, and have watched hundreds from the audience. Of those, a few stand out in memory for creating particularly strong emotional responses in audiences. One of them, the play *I and You* by American playwright Lauren Gunderson, stands apart from the rest. I remember seeing it produced at City Lights Theater Company in 2016 and leaving the theatre with my heart pounding and tears running down my cheeks. It is a story about a high-school girl, Caroline, who is home from school with a long-term illness, and her classmate, Anthony, who comes over to work on a school project they've been assigned to do together. The subject is Walt Whitman's *Leaves of Grass*, and Caroline, while initially against any perception of "pity for the sick girl" comes to respect, and even cherish the friendship she forms with Anthony.

Gunderson's dialogue is witty and fast paced, with many callouts that remind us of what it was like to be a teenager with raging hormones, attitudes, and angst. It is a story that resonates with many people; it is one of the most-produced plays by Gunderson, who herself is the most-produced playwright in the United States (TCG). Particular to my research, the ending scene of the play is designed to be an emotional rollercoaster. The characters discover shocking facts about themselves and each other. The audience has little time to empathize with these new character revelations, and their instant ramifications, but clearly the very sudden twist engages an emotional response. It seemed the perfect vehicle for studying how multiple audience members reacted physiologically to a strong emotional scene about characters they have spent the preceding 90 minutes of the play growing to love.

I contacted Lauren Gunderson by email and explained my interest in her work and the scope of my research. She responded that she was very interested in learning the results from my research, and we set up a call to discuss in more detail. On the call, she mentioned to me that *I and You*, while being popular in the United States, had never been produced in the United Kingdom, but that the U.K. premiere of the play was scheduled to be produced by the Hampstead Theatre in London in 2018. She also agreed to be interviewed for the research, to better understand how a playwright writes a play for emotional response.

Thoughts from my interview with playwright Lauren Gunderson

From the start of this research project, playwright Lauren Gunderson has been generous with her enthusiasm and time. I interviewed her about her perspective on how emotion impacts her writing, and it seems that audience emotional response is always a consideration:

> The short answer is: I am always thinking of the audience. I became a playwright partly because I liked being in an audience. I was writing for an audience of "me," first knowing that if it made me feel and think, it would probably make someone else do the same. So I always think: "What is the experience of watching this?" Which is very different than the experience of writing it because you don't get surprised, you don't have a gasp. I design for surprise, and I design for a gasp, but I don't get to feel those because I see it coming.

Gunderson also underscored that from her perspective, audience emotional response varies from person to person, and this is expected:

> […] the truth is everybody's going to react differently, and it means something different to every person. Now, those differences can be quite nuanced. They can be very similar. Sorrow is kind of similar no matter what the specifics of your life have been. Betrayal feels similar. Heartbreak. Triumph. So, there are baskets of things that we all usually come into contact within our life and pull from. I think for *I and You*, what's interesting is a 16-year-old watching the play will probably connect with the character of Caroline in a different way than a 45-year-old mother of a 16 year old will. So, the mom looking at that would be like, "Oh, God, please take care of yourself, kid." Where the 16-year-old is like, "Yeah! Break all the rules! Get out of there!"

A complete transcript of my interview with Lauren Gunderson can be found in Appendix 1.

Based on Lauren's recommendation, I contacted the Hampstead Theatre, who agreed to participate as the partner for the research study. Exact dates for the run were not finalized until much later, when it was revealed that the part of Caroline would be played by actress Maisie Williams in her stage debut. Williams is best known for her portrayal of Arya Stark on the television show *Game of Thrones* and her addition to the cast was expected to generate substantial additional press for the production. Conducting this research at the U.K. premiere of the show also solved several challenges. For one, nobody in the premiere audience had ever seen the play. It's rare for an entire audience to experience a play for the first time, and this scenario also eliminates the chance that the emotional responses of audience members would be

influenced by the experience of attending previous productions of the same work. Logistically, conducting the research with a U.K. theatre would allow my supervisors to attend and participate, and anyone else who wanted to audit the experience or the research. Once dates were announced, Hampstead Theatre staff and I selected the final preview performance of 24 October 2019 for the research study.

Equipment

Using my framework and my worksheet on considerations for physiological measurement in the theatre in Appendix 6, I reviewed the equipment options and pricing available as of early 2018 (a complete list is provided in Appendix 2) and selected a wristband measurement device called the E4 by Empatica. The E4 seemed an excellent fit for several reasons, including its ability to measure multiple physiological signals, its internal storage of data, its small size, and its lack of blinking lights which could cause distraction. The device measures skin conductance, heart rate, heart rate variability, skin temperature, and movement in 3D space via an accelerometer, and in testing, the E4 device was found to be equivalent to other popular physiological measurement not suitable for use in the theatre setting (McCarthy, et al.). A key benefit of working with Empatica was their E4 band rental program, allowing researchers to acquire many E4 bands for experimentation for short periods of time. With the bands retailing for approximately £1,500 each, renting offered significant savings. Three months before the experiment, I contacted

Fig. 4: E4 by Empatica. Image from https://e4.empatica.com/e4-wristband

Empatica to inquire about the rental program, and was told that the program had been cancelled, as it was not generating significant revenue. I reached out to Empatica to find out if they would be willing to donate use of the E4 devices for the research, but they declined. UCLan needed E4 devices for other research students, so the university agreed to purchase 7 devices. Additionally, I borrowed three E4 devices from Dr. Tahmina Zebin at Manchester University, and one E4 device from Dr. Stewart Birrell at the University of Warwick, making eleven devices available for the study.

Identification of research participants

Early on in my discussions with Hampstead Theatre, we identified the real possibility of audience members being triggered by the emotional aspects of the play. As an example, an audience member who had lived through the experience of having a life-threatening illness (or had experienced this with a family member) might have a damaging emotional response to the story of the play. To guarantee that audience members had considered the emotional implications of seeing the play, Hampstead Theatre and I agreed to recruit study participants from audience members who had already purchased tickets for the October 24 performance. An email advertisement was created, inviting ticket holders for the October 24th performance to fill out an online form indicating their interest in participating in the study. From the respondents, ten participants and two alternates were randomly selected, and notified of their acceptance in the study, with a promise of £25 Amazon gift card for their completed participation. Participants were asked to be at the theatre twenty minutes prior to the official opening of the doors so that they could be prepared for the study.

The day of the study

On the day of the study, one of the E4 devices would not boot and was found to be inoperable. Of the other ten devices, several requested a firmware upgrade, and while they needed to be rebooted several times to complete the process, all upgraded successfully. I brought the devices to Hampstead Theatre, and met up with my PhD supervisor Theresa Saxon, and an industry friend, Hannah Fiddy, who had both agreed to help as research assistants. The staff at Hampstead Theatre set us up with a table in the downstairs area of the main lobby. The box office staff were told to send anyone who identified as a participant in the study down to us to be fitted with the bands. As the lobby opened, a steady stream of participants met us downstairs, completed a consent form, and were fitted with a band. After each participant was fitted, they were asked to stand quietly for 3 minutes to get a baseline of physiological response. Once the baseline was captured, participants were released back into the lobby to see the show but reminded to return the band at the end of the performance. I attended the performance, sitting near the exit, to follow along with the script and monitor time.

Being more familiar with seeing theatre in the U.S., I was interested to see how full the lobby and bar area at Hampstead Theatre was, even 30 minutes before the house opened. Audience members seemed relaxed, with many talking informally and getting drinks from the bar. I remember thinking that, at least in this case, U.K. audiences showed up to the venue far earlier, and were far more relaxed than U.S. audiences (who often show up at the very last minute, rushing to their seats). I have been thinking about how this might impact emotional response measurement in U.S. vs. U.K. audiences. Cultural researcher Alan Brown has theorized that audience emotional response is stronger when they are “ready to receive” the work, which

includes how they are prepared for the event, and what they walk into the space thinking and feeling (Brown). It may be that audiences that are more relaxed before a performance are more ready to receive the work, in contrast to audiences that stressfully rush to their seats in the last few minutes before the curtain. Research seems to support this idea. Ekman found that changing from one emotion to another often requires time: emotion dissipates slowly, and we often consciously or unconsciously search for additional ways to stay in the current emotional state (Ekman). Western theatre is focused on trying to get audience members to empathize with stage characters — a difficult thing to do if an audience member is bringing the stress of the outside world into the venue.

The play began at 7:37pm. There was insufficient lighting to record timestamps on in the script, so I made an audio recording of the production so that timestamps for specific events could be captured with the script following the performance. At the end of the performance, I returned to the check-in desk to receive the bands back from participants. Given the emotional experience participants had just gone through, I was concerned that they might forget that they were wearing the E4 band and fail to return it. To help ensure that no participant escaped from the building wearing a band, Theresa Saxon stood at the main exit with a sign that said, “Please return bands downstairs”. This was effective, as I received all 10 bands back, but it did create questions: audience members who did not participate in the study wanted to know what bands we were talking about. As each participant returned the band, I handed them a short questionnaire asking them about their emotional reactions to the play (questions can be found in Appendix 5). All participants filled out the form, with some spending several minutes in thought before returning it. Once all bands and forms were received, I packed the E4 devices, thanked the staff, and left the venue. That evening, data from each band were downloaded, and the

timestamps for each page were recorded in the script as per the audio recording, which was then deleted.

Once I returned home to the U.S., I emailed the participants and chose a date/time to call them from one of their suggestions. The first follow-up call happened approximately two weeks after the performance, and calls happened over a 15-day span. Each participant was asked to share what emotions they remember feeling now that a couple of weeks had passed. In addition, each participant was read their answers to the paper questionnaire they filled out at the performance and asked to elaborate on their answers. Once the phone call with complete, I sent each participant a £25 Amazon gift card electronically and begin qualitative and quantitative analysis on the data captured.

Part Two: Research Results

Does Everyone Feel for the Hero? Measurement of theatre audience physiological and emotional response to a theatre performance

Abstract

Theatre performance is designed to create emotional experiences. Playwrights structure plays for emotional response, but little is known about how audiences respond to these emotional expectations. This study seeks to determine if these emotions can be objectively and subjectively measured during live theatre performance at a climactic part of a play, based on two hypotheses. First, the physiological responses of audience members will increase for skin conductance, heart rate, and skin temperature at the climax of the play as compared to two other randomly selected

sections of the play. Second, audience members will describe feeling similar emotions at the climax of the play. To test this, physiological data from 9 participants attending a 90-minute theatre performance were measured. Each participant wore a wristband that collected physiological data throughout the performance, answered a one-page questionnaire at the end of the performance to subjectively capture their emotional reactions, and were interviewed by phone approximately two weeks after the performance. Physiological data were analysed using SPSS ver. 28, and emotion words used were counted and analysed in all questionnaire and interview data. The results show a significant increase in arousal in skin conductivity, and a decrease in heart rate and skin temperature among participants at the surprise climax of the play as compared to their responses at two other plot points. Questionnaire and interview results for each participant found that sadness and surprise were the two emotions participants most often reported feeling as a response to the climax of the play. The results of this research may have future applications in better understanding how audiences react to specific plot points of a play from both play producer and personal development perspectives.

Keywords
emotion · theatre · physiological response to emotion · audiences

Introduction

Live theatre performances are designed to be emotional experiences, with a variety of end goals, such as changing human behaviour (Gilbert 301), creating social change (Boal), helping people to process grief (McKenna), to attain group results that benefit society, and as

entertainment (Schechner and Schuman). Playwrights design plays to have a variety of contrasting emotional moments, such as comedy and tragedy, through the narrative arc of the story (Levy). Theatre audiences enjoy the rituals of attending the theatre, such as anticipating attendance, experiencing emotional stories in a group setting, and integrating themes and meaning into their thinking after the production (Walmsley). While theatre plays an important part in the lives of nearly 25% of the population of the United States alone ("U.S. Patterns of Arts Participation" 95) attendance to theatre has been declining in recent years (Cohen) and the COVID-19 pandemic has caused theatre companies to additionally lose more than £1.04 billion in turnover (Watling). Efforts to discover new strategies to stop this trend, and potentially reverse it, are paramount. Research has shown that "having an emotionally rewarding experience" is a major motivation for attending a play, but audience members often fail to achieve that goal (Ostrower). A better understanding of the emotions theatre audience experience while watching a play may identify strategies to reverse this decline in attendance, and help theatre companies not only to survive, but thrive at a time when the benefits of attending the theatre are greatly needed.

Challenges to measuring emotional response

When measuring emotional response, several concerns must be considered and corrected. One is the observer effect: the act of measuring emotion may influence the emotion itself. When making decisions on methods to assess emotional experiences, researchers must "balance the desire for valid and perhaps even continuous emotion experience reports against the competing desire not to interfere with emotional responding […]" (Rottenberg et al. 13).

Another concern is the massive amount of data that studies of emotion often generate. For example, sensor equipment such as the Empatica E4 wristband record physiological data at up to 64 data points per second ("Empatica E4 Sensors"). Such data rates can quickly generate huge datasets that hit limits put in place by some software packages, such as Microsoft Excel (Jacobs 36-44). To address this issue, researchers often average together responses to look for trends, and, with emotions often existing for a brief time of between .5 and 4 seconds (Ekman 332), there is a risk that this averaging process will be "watered down" by data related to periods of time where no emotional response was observed (Rottenberg et al. 14).

While the measurement of physiological signals has become far easier due to the miniaturized technology, unchanged is the need for verification of the subjective emotion felt by the participant. Wallbott and Klaus clarify:

> Although in principle we can measure the objective underpinnings of emotional experience as far as physiological changes and expressive behaviours are concerned, the self-report is our only access to motivational changes and action tendencies as well as the subjective feeling state (57).

Other challenges to gathering accurate data include the individual differences in emotional response, or person specificity, which may be connected to individual factors such as age, gender, and intelligence (Wallbott & Scherer 59). Individual emotional response has also been found to be governed by cultural "display rules" – people attempt to mask their feelings from others and/or adapt emotional expression to the expectations of those who are present (Ekman).

The link between physiology and emotion

As emotions are experienced, the body responds physiologically to "allocate perceptual, cognitive, and bodily resources to accomplish an emotion's goals" (Philippot and Feldman 36) . This is based on unconscious behaviour not under cognitive control. For example, researchers have theorized that the physiological reaction to fear in sweat glands of the hands and feet allowed primitive humans with additional traction to escape a predator (Everts). The Autonomic Nervous System (ANS) combines the sympathetic nervous system (responsible for bodily functions needed to quickly change our arousal response to a stimulus such as heart rate, and blood pressure increasing to escape a threat) and the parasympathetic nervous system, which controls slower activities such as digestion and reproduction (McCorry 78). The ANS is always active to keep the organism in homeostasis. When a stimulus such as a threat is encountered, the ANS reacts by changing our arousal response. It is these changes in the body's arousal response that can be measured from a baseline in response to a provided stimulus (Alshak and Das). Measuring the physiological response to emotion has a long history in laboratory studies (see Stern et al.; Hugdahl). Physiological measurements such as electrodermal skin conductance, heart rate, and temperature are frequently used in lab studies. Researchers have created various models to try to map out emotional response, most notably Russell's arousal/valence scale (1161-1178) which is widely used in the measurement of physiological response to emotion. Researchers have attempted to take the logical next step: trying to identify unique patterns of physiological response linked to specific emotions.

William James is credited for being the first to suggest that different emotional states (such as sadness, fear, etc.) involve a signature pattern of ANS activation, which he referred to as emotions that "have a discrete bodily expression" (James 188-205). Researchers have had mixed results with this theory. In a large meta-analysis covering 37 different ANS measures, only a

small number were found to provide specific responses to discrete emotions (Cacioppo et al.). For example, heart rate increases for both fear and anger, so differentiating a specific emotion is impossible with one measure alone. There is as of yet no "magic bullet" to identify specific emotions purely from physiological data with high accuracy, as we have seen from the attempted use of lie-detection devices in the courtroom (Faigman et al.). So, while the measurement of physiological signals allows for continuous monitoring of autonomic nervous system response, it is done at the expense of the ability to link specific ANS responses to specific emotions.

Emotional measurement in a theatre venue

As identifying discrete emotions from physiological data has to date proven difficult, a variety of methods of measuring emotional response exist, each with strengths and challenges (Balters and Steinert 1585). In a theatre context, research on the emotional response of theatre audiences is often carried out via surveys answered by audience members after the production (see examples in Ostrower; Brown and Ratzkin). This self-report method is advantageous as it is inexpensive to administer, does not need high technical knowledge, and allows participants to share how they are feeling about an experience in their own words. However, this method is problematic due to the risk that audiences will only report the strongest or most recent emotions felt, and may forget or misattribute emotions felt earlier in the performance (Latulipe et al. 1847).

With plays often running several hours, it is unlikely that audience members can accurately recall all the emotions felt during a production via a post-performance survey. Additionally, people have varying ability to accurately describe the emotions they are feeling

(Levenson 35) and time elapses between stimulus and self-report may distort the memories of emotions felt (36). Recent successes in the miniaturization of physiological measurement technology have created a new opportunity to explore theatre audience emotional response using professional-grade lab equipment inside the theatre venue, in a way that is minimally impactful to the attendance experience. Physiological data can be captured over the entire theatrical experience, and/or at specific points in the plot of interest to theatre creators. Research has shown that identifying discrete emotional response purely from physiological data is elusive. By combining physiological measurements with a post-performance self-report questionnaire and a one-on-one interview two weeks after the performance, this mixed-methods study addresses these concerns and allows both objective and subjective emotional data to be captured in a novel way.

Aim and Hypothesis

This study seeks to determine if audience emotional response can be objectively and subjectively measured during live theatre performance at what may be the most emotional part of the play: the climax. To accomplish this, two hypotheses are tested:

- H1: audience members will respond with similar heightened emotional arousal to the surprise climax of a play designed by the playwright to achieve emotional response. Specifically, physiological responses will increase for skin conductance, heart rate, and skin temperature as compared to two other sections of the play.
- H2: audience members will report feeling similar emotions at the climactic point of a play.

Methods

Stimuli

The U.K. premiere of Lauren Gunderson's play *I and You* was chosen as the external stimuli, as the characters in the play experience high emotions, and the climax of the play has a surprise plot reveal with a strong potential to create an emotional reaction in audience members. The U.K. premiere of the play offered an opportunity to measure the responses of audiences who were unfamiliar with the ending. Lauren Gunderson, the playwright of *I and You* agreed to be interviewed for the research (see Appendix 1 for a full transcript) and was present at the performance where the experiment was conducted.

Materials

In this mixed-methods study, physiological measures were gathered from each participant using the E4 digital monitor wristband by Empatica, which captured skin conductance (sampled at 4 Hz), heart rate (sampled in 10-second intervals), and skin temperature (sampled at 4 Hz). Wristbands were tested in advance of the experiment to verify that physiological data was captured and able to sync to E4 Connect, the cloud software provided by Empatica. Physiological data were paired with a self-report questionnaire and a follow-up interview. A one-page questionnaire was designed (see Appendix 4) to capture a self-report from each participant at the end of the performance, asking about their emotional experiences during the play. Participants were asked to suggest three follow-up dates and times for a phone interview. Based

on participant availability and the desire to interview all participants in a similar window of time, interviews were conducted via Skype between 10 and 15 days after the performance (see Appendix 5 for the interview script).

Selection of Participants

In total, 9 participants completed this study. No demographic information was captured; participants were instead randomly selected from ticket purchasers who volunteered themselves to be considered based on an email from the theatre company. All participants were ticket purchasers for the 24 October 2018 performance of Lauren Gunderson's play *I and You* at the Hampstead Theatre in London. The first 10 participants to respond were recruited from their response to an email sent by the venue asking for study participants. All participants provided consent and were told that they could withdraw from the study at any time. Each participant was assigned an identification number and matched with a corresponding serial number on the wristband sensors.

Procedure

Participants were asked via email to arrive at the venue 30-minutes before the performance, and to report to a table in the lobby to be fitted with a wristband. Participants arrived at staggered times, and once fitted with a band, participants resumed their normal pre-performance activities. A time-stamped audio recording of the performance was made, so that start, end, and key plot points could be mapped to participant physiological response without disturbing audience members or actors with light needed for paper notes. These data points were

later applied to each page in the script, and the audio recording deleted. Heart rate, temperature, and skin conductance measurements were recorded starting from initial placement on each participant's wrist, to the disconnection of each band after the performance. Baseline data for each participant consisted of a 3-minute segment early in the first act when the participants were stationary. Signs were displayed reminding audience members to return their wristbands during exit. As participants returned to the equipment staging area in the lobby, wristbands were removed and each participant was asked to fill out a one-page questionnaire asking about their emotional experiences, possible interference of the theatre experience by wearing the wristband, and a request for dates for a follow up phone interview. Participants were thanked for their participation and follow up phone interviews were held over the next few weeks. All participants were successfully interviewed and received a £25 Amazon digital gift card.

Data Coding

For hypothesis one, skin conductance, heart rate, and skin temperature data were downloaded from the Empatica E4 connect cloud software. Data recorded prior to the performance start time was discarded, syncing the start time of all wristbands. The resulting dataset was too large to be imported into SPSS, so data were averaged to a uniform one data point per second using a custom Excel macro. As the time between the beginning of the climax of the play to the end of the play is 3 minutes, data from the full performance were coded into 3-minute segments, including the final 3 minutes at the climax of the play. To measure physiological response against the final 3 minutes of the play, random.org was used to generate two numbers used to select two other random 3-minute sections of the play. Participant data outside of these three 3-minute segments were discarded. Using SPSS ver. 28, the means and

standard deviations of the measured variables were calculated. Data from one participant showed dramatically higher physiological responses as compared to other participants, and was discarded as an outlier.

For hypothesis two, post-performance questionnaire and follow-up phone interviews were transcribed. Named emotions mentioned in interviews were counted by hand and tracked via Excel, following the emotional coding method described by Saldaña (160).

Results

To test hypothesis one, a one-way repeated measures ANOVA was run for each of the three variables. Skin conductance, heart rate, and skin temperature from 9 participants were measured using an Empatica E4 wristband at three sections of the play: Section 1, Section 2, and Section 3 (the climax). The mean and standard deviation for computed for all participants across all three time periods.

Skin Conductance

Table 1: Shows the Mean and Standard Deviation for skin conductance.

	Mean	Standard Deviation	N
Section 1	.37	.27	1440
Section 2	.28	.12	1440
Section 3	.76	.92	1440

For skin conductance, there was a significant main effect of time period, $F(2,1438) = 382.51$, $p < .001$, eta^2 = .21. This shows that there is at least one statistically significant difference between the three groups. Therefore, to see where the difference lies between the time periods, 3 paired samples t-tests were conducted, and the alpha was adjusted accordingly ($\alpha = .05/3 = .017$). As shown in Table 1, skin conductance values were higher in section three (M=.76, SD=.92) in comparison to section one (M =.37, SD = .27), $t(1439) = 19.21$, p <.001; d = .57, and section two (M = .28, SD = .12), $t(1439) = 20.25$, p <.001; d = .72. Furthermore, skin conductance values for section one (M=.37, SD=.27), were higher than for section two (M = .28, SD = .12), $t(1439) = 12.78$, p <.001; d = .41. Taken together, these findings suggest that section three of the play (the climax of the storyline) elicited a greater change to physiological/skin conductance response which is taken to mean a greater emotional reactivity as compared to the other two sections.

Heart Rate

Table 2: Shows the Mean and Standard Deviation for heart rate.

	Mean	Standard Deviation	N
Section 1	74	7.48	1440
Section 2	78	8.44	1440
Section 3	76	10.42	1440

For heart rate, there was a significant main effect of time period, $F(2,1438) = 188.90$, $p <$ .001, eta^2 = .76. This shows that there is at least one statistically significant difference between the three groups. Therefore, to see where the difference lies between time period, 3 paired samples t-tests were conducted, and the alpha was adjusted accordingly ($\alpha = .05/3 = .017$). As shown in Table 2, heart rate values were higher in section three ($M = 76$, $SD = 10.42$) in comparison to section one ($M = 74$, $SD = 7.48$), $t(1439) = 4.15$, $p <.001$; $d = .12$, and lower in comparison to section two ($M = 78$, $SD = 8.44$), $t(1439) = 9.22$, $p <.001$; $d = .27$. Furthermore, heart rate values for section two ($M = 78$, $SD = 8.44$) were higher than for section one ($M = 74$, $SD = 7.48$), $t(1439) = 20.47$, $p <.001$; $d = .46$). Taken together, these findings suggest that section three of the play (the climax of the storyline) elicited a statistically significant difference in physiological response/heart rate compared to the other two sections, which could indicate emotional reactivity, however the small effect size and confounding factors not considered make identification of emotional reactivity specifically from heart rate alone difficult.

Skin Temperature

Table 3: Shows the Mean and Standard Deviation for skin temperature.

	Mean	Standard Deviation	N
Section 1	34.2	1.73	1440
Section 2	34.8	1.15	1440
Section 3	34.56	1.34	1440

For skin temperature, there was a significant main effect of time period, $F(2,1438) = 560.07$, $p < .001$, eta^2 = .28. This shows that there is at least one statistically significant difference between the three groups. Therefore, to see where the difference lies between time period, 3 paired samples t-tests were conducted, and the alpha was adjusted accordingly ($\alpha = .05/3 = .017$). As shown in Table 3, skin temperature values were higher in section three ($M = 34.56$, $SD = 1.34$) in comparison to section one ($M = 34.2$, $SD = 1.73$), $t(1439) = 21.01$, $p < .001$; $d = .17$), and lower in comparison to section two ($M = 34.8$, $SD = 1.15$), $t(1439) = 22.04$, $p < .001$; $d = .25$. Furthermore, skin temperature values for section two ($M = 34.8$, $SD = 1.15$) were higher than for section one ($M = 34.2$, $SD = 1.73$), $t(1439) = 25.39$, $p < .001$; $d = .40$. Taken together, these findings suggest that section three of the play (the climax of the storyline) elicited a statistically significant difference in physiological response/skin temperature compared to the other two sections, which could indicate emotional reactivity, however the small effect size and confounding factors not considered make identification of emotional reactivity specifically from skin temperature alone difficult.

To test hypothesis two, named emotions mentioned in questionnaires and interviews were counted by hand and tracked via Excel. Results were entered into edwordle.net to generate a

word cloud (see Fig. 5). Individual responses were also compared to respective participant physiological data to link emotions mentioned with physiological data captured. Participants reported feeling a variety of emotions at the end of the play, as can be seen in Fig. 5, where a larger font size indicates more frequent mention of a specific emotion. Similar words were combined (for example, “sad” “tearful” and “sadness” were all combined and coded into “Sadness”). “Surprise” and “Shock” were frequently mentioned Two participants also reported a change of emotional state without mention of a specific emotion (“moved” and “emotional”) as well as an unemotional satisfaction for the experience (“met expectations” and “satisfied”). The post-performance questionnaire form can be found in Appendix 5.

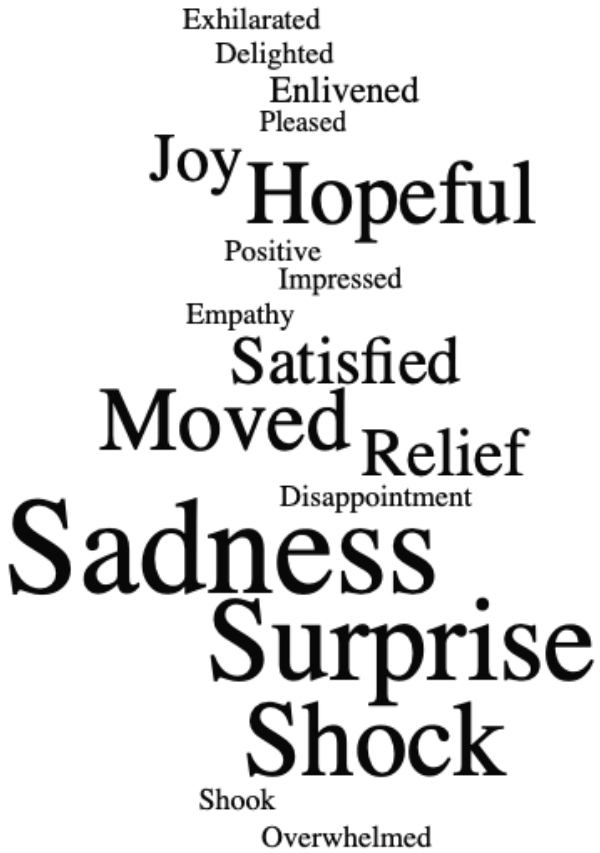

Fig. 5: Word cloud of self-report emotion responses

Extended follow-up interview responses

When asked to explain the labels they gave for the emotions they felt, participants responded in detail about their feelings, which have been grouped into four trends (see Appendix 5 for the interview protocol).

Trend 1: Sadness, surprise and shock during the climax plot reveal

At the climax of the play, participants most commonly reported feeling sadness, surprise, and shock. Highlights of narrative responses include:

> […]…the fact that it was a young boy, who's been such a pleasant, warm character, and […] the tragedy of somebody who's so young…[…]

Another commented:

> I was obviously upset at the end. I was quite tearful. I quietly cried.

Trend 2: Changing emotional energy throughout the play

Participants reflected on the fast pace of the play, the balance between humorous and touching moments between the characters, and how easy it was to quickly care about the characters and what happens to them over the course of the story. Highlights of participant responses include:

> It was an emotional rollercoaster given the quick transitions from funny to hard hitting. The relationship between the characters made me feel home for the two of

> them, and then of course, sudden disappointment and shock, given the ending. I thought it was brilliant.

Another commented:

> I liked the contrast between humour and an upsetting story.

Trend 3: Empathy for the female character, Caroline

Participants reported empathizing with the main character, Caroline, who is given an opportunity to form a relationship while at home with a life-threatening illness. Highlights of participant responses include:

> […]especially as you were sort of rooting for her to what appeared to be potentially a relationship that she could go forward with, and it'll not necessarily be as it seemed.

Trend 4: Personal life experience connected to a family member or friend who experienced a life-threatening illness

Participants were asked about their personal connections to friends or family members who had been affected by a life-threatening illness, and how that influenced their feelings about the play. Highlights of participant responses include:

> One of my brother's best friends, he passed away because of a… similar kind of cardiac type thing… that's why I felt sad at that point, potentially more than other people might've felt at that point.

Another commented:

> There was a girl who I was at school with who had a genetic condition and it meant that she had problems with her heart, and she passed away when I was 17. So, to me, it was quite poignant for me to sit through the play, knowing what I knew about the characters; I did have first-hand experience with it.

Taken together, the results from the questionnaire and follow-up interview process partially support both hypotheses. For H1, questionnaire and interview responses verify that the physiological changes that were recorded from participants during Section 3 (the climax of the play) are the result of feeling strong emotions as shared by the participants in their own words. While it was expected that increases would be seen for all three values, skin conductance increased, and heart rate and skin temperature decreased during section 3 (the climax of the play) as compared to the other two sections. For H2, results from the questionnaire and interview process show that participants reported feeling similar emotions at the climax of the play, most commonly sadness and surprise.

Discussion

The aim of this study was to determine the emotions of audience members during a live theatre performance can be objectively and subjectively measured at a climactic part of a play. To accomplish this, two hypotheses were tested: H1: that physiological responses of audience members experiencing the climax of a play would increase for skin conductance, heart rate, and skin temperature as compared to two other sections of the play, and H2: that audience members would describe feeling similar emotions at the climax of the play.

For H1, results partially support the hypothesis. Increases were seen in skin conductance for the climax of the play, but heart rate and skin temperature decreased. While unexpected, this

finding supports previous research that shows a variety of increases and decreases in physiological response of participants as they listen to emotional music selections (Krumhansl 343). I have shown that the identification of discrete emotions from signature physiological patterns is problematic, however, the decreases in heart rate and skin temperature seen in the data may be explained as indicators of the predominant emotions participants reported feeling: surprise, and sadness. Existing literature provides many examples of the physiological responses that are expected for humans feeling sadness, surprise, etc. (see Kreibig's substantial review). For example, sadness has been linked to increases in skin conductance and decreases in heart rate (Kreibig 401) and skin temperature (Collet et al. 53). To sum up, it is clear that an increase in physiological arousal is not a required indicator for strong emotions to be occurring. A more accurate physiological indicator of emotions being felt may be instead the amount of change of physiological measures from baseline. All three measures showed significant change in section 3 as compared to the other two sections, with skin conductance showing a large change, and heart rate and skin temperature showing moderate, but still significant change. Although expected physiological patterns for emotional response generally matched what participants reported feeling, the clear identification of specific emotions from physiological data that, as William James suggested, "have a discrete bodily expression" (188-205), was not seen. Such predictive capability is still a developing science: another experiment using a smart watch to link signature patterns of autonomic nervous system measurements to specific emotions achieved a prediction accuracy of 65% (Pollreisz and TaheriNejad). However, accuracy in identifying discrete emotions from autonomic nervous system activity may increase with the layering of multiple physiological measures such as cardiovascular, electrodermal, digestion, homeostasis, effort, and attention (Mauss and Robinson 5).

Additionally, we must consider the role of individual differences in emotional response. Rottenberg, Ray and Gross point out that individual differences "influence emotion generation at every stage in the process" and include variables such as dispositional mood, emotional reactivity, emotion regulation styles, personality traits, physical health status, and other characteristics such as "gender, race, class, and culture" (11). With the small sample size of this study, individual differences in emotional response in the participants are likely more prominent. For example, data from one participant were removed as a potential outlier. Readings from this participant were dramatically higher than all other participants during section three, the climax of the show. When interviewed, this participant reported that they had recently lost two close family members to cancer, and that the climax of the play was emotionally impactful for them. One possible explanation supported by the post-performance interview is that the physiological measurement equipment captured the moment this person was emotionally triggered by the play, based on their actual life experience. The results may also be explained by malfunctioning equipment. The explanation cannot be determined using the existing research design.

It follows that future research could specifically measure the impact of life experience on emotional responses to sensitive topics, as compared to a control group. However, an important takeaway is the idea that, although theatre companies attempt to decide what stage content may be triggering to people (issuing a "trigger warning" for example), the reality may be that we cannot predict what topics will be sensitive, as we may never know what will trigger individuals. If these triggering experiences are unpredictable, massive emotional experiences may be happening frequently to a changing subset of audience members, further underscoring the importance of emotional engagement research.

Due to the fact that wearing the bands themselves could have impacted the emotions felt by participants, each participant was asked if they were aware of wearing the Empatica E4 wristband, and if so, did it change their theatre experience. 75% of participants said "I forgot that I was wearing it" with the remaining 25% said they were "slightly" aware of wearing it. This suggests that wristband-based measurement devices are well tolerated by theatre attendees, with a low likelihood of responses being affected by knowledge of being monitored.

For H2: although participant responses via the self-report questionnaire and interview on emotions felt were mixed, it is clear that all participants felt emotion at the climax of the play. As "having an emotionally rewarding experience" is a goal of many who attend theatre (Ostrower), this, in itself, is a successful outcome. The performance was also a success from a playwriting perspective. In an interview with Lauren Gunderson, the playwright of "I and You", when asked if she considered the emotional response of the audiences to different parts of the play, she said:

> I certainly do think of the audience. And for most of the show, if you were to stop at any moment, I could tell you what I have intended for the audience to feel. […] I became a playwright partly because I liked being in an audience. I was writing for an audience of "me," first knowing that if it made me feel and think, it would probably make someone else do the same. So I always think: "What is the experience of watching this?" Which is very different than the experience of writing it because you don't get surprised, you don't have a gasp. I design for surprise, and I design for a gasp, but I don't get to feel those because I see it coming. (Evans and Gunderson)

Although participants most often reported feeling "sadness" and "surprise", they spoke of the play in positive terms, calling it "sooo good", "really clever", "very sweet", "hard hitting" and that the play "hit close to home". One participant said they felt nostalgic, as the play "transported me back to my teenage years". From this, we may theorize that, at least in this exploratory study, participants do not need to specifically feel positive emotions to report a positive experience – just feeling any strong emotion is a positive experience.

While not a focus of the study, analysis of the interview transcripts also revealed that participants were very interested in their own physiological and emotional data. One asked "Have you got my data there? Are you looking at my data now? Can you see where it's gone up in heart rate and stuff?" Another asked "What did my results show?" While more research is needed, artistic programming that allows audiences to access new layers of their emotional experience may be of interest, and may drive future attendance. Several others asked about what would be done with the data collected and how it would be used, underscoring the importance of privacy and of protecting user data. While the collection and analysis of biometric data in a theatre is in its infancy, one can foresee a future where proof of emotional response to controversial subjects seen onstage put audience members at risk, similar to preference information that can currently be gathered through internet search history or visited websites.

Limitations

This study utilized a mixed-methods approach, allowing for the objective and subjective capture of emotional response from audience members during the climax of a play. The procedures and findings reported may be helpful to playwrights and theatrical producers wishing feedback about the emotional impact of specific parts of a play. While mixed methods approaches benefit from the valuable ability to explore a research question from different perspectives, this research method can also be more demanding of time, resources, and skillsets (Regnault et al.). With any study design, strengths and weaknesses evolve out of the choices made, and methods of research are always a form of compromise. A weakness of this study is the small sample size; due to the availability and cost of the Empatica E4 wristbands, only 9 were used at only a single performance. On my initial design of the study, I considered it important

that the audience being measured should see the exact same stimulus, which can only be captured during a specific performance (as each performance is subtly different in many ways such as slightly different start times, actor line speed changes and the evolution of character choices that happen over many performances). In retrospect, given my decision to focus on specific plot points in the play, the impact of minor differences between multiple performances would likely be also minor. Additionally, while a multiple performance approach would have allowed for a larger sample size of audience member responses, it would have been impractical for a theatre company to support the research over multiple days. Another approach to increase the sample size, especially relevant to future research, would be to use less-expensive equipment that simply captures skin conductance, as temperature and heart rate. Though in conception, this research project posited that such measures would be of significance, in reality, they proved to be less useful than expected. Of the physiological channels measured (skin conductance, heart rate, and skin temperature) skin conductance most clearly identified the differences of physiological response to the climax of the play, in line with other studies that have used this method (see Wang et al., Wu et al., Stern and Lewis). As technologies continue to evolve, prices will likely reduce, allowing for more units of equipment to measure a greater number of participants. Researchers planning future studies may benefit from selecting devices that are less expensive and only measure skin conductance as possible choices to gain the benefits of a larger sample size and a reduced influence of individual differences in the measured emotional response. Also, technologies for measuring emotional response such as pupillary response and facial expression capture, while not currently practical for use in the theatre venue, but may be more practical in the future as technology evolves.

As I have described, capturing baseline physiological measurements is an important step to recognizing emotional response. My initial research design called for participants to sit for several minutes prior to entering the venue, to gather baseline readings. However, this design was limited by the realities of the pre-performance experience: while some participants followed the directions, others did not reliably sit still, spent the time enthusiastically talking with their partners, etc. The choice was made to use a random 3-minute segment from Act 1 as a baseline, with the idea that capturing physiological response during a period of exposition would mean audiences were sitting still and in a focused place. Future studies might omit random samples and simply select a section of the play with low expectations for emotional response for use as a baseline.

The study design resulted in the successful capture of valuable qualitative responses able to be matched to the corresponding quantitative physiological responses captured at the climax of the play. However, these qualitative responses were not captured for the two other 3-minute segments of the play, due to the choice to select these sections randomly. This disallows for the subjective description of what audience members were feeling during these two other sections. Future researchers might decide instead to select sections of the play where qualitative responses might more easily be gathered, such as the end of an act leading to an interval/intermission. As I describe in Appendix 3, I was involved with a prior experiment asking audience members to reflect on the emotion they thought a character had been feeling at the end of the first act, and their one-word answers appeared on a word cloud in the lobby during the interval, allowing for a group reflection on emotional experience.

While the choice to select three 3-minute sections (including the climax of the play) achieved the research goals and was made due to practicalities of data management, this choice

discarded the majority of physiological response captured during the full length of the play. Future research with evolving options for alternate equipment and data analysis tools may allow for the ability to explore emotional response to any section, line, or even an individual beat of a play.

Additionally, several participants reported having intense emotional responses that they attributed to knowing someone with a life-threatening illness. Experiencing theatre containing similar themes may be beneficial to working through difficult feelings, or may instead be a harmful trigger, reminding them of sad past events. This finding questions the current practice of theatre leaders deciding if content presented onstage necessitates a trigger warning to audiences -- the unique life experiences of each person entering the theatre venue may make this impossible.

Conclusions

Considering these findings, theatre creators can feel confident that audience emotional response can be objectively and subjectively captured via wearable technology from audiences in real time during a performance, and that the process is well tolerated by audience members. The combination of physiological measurement, confirmed by emotions felt via self-report may allow theatre creators to explore how changes in a play affect the emotions of audience members while the play is still in development. Additionally, the results hint at the influence that emotional life events may have on audience members viewing theatre with similar themes.

6. DISCUSSION

> "The empathetic quality of the theater-going means that some version of what the character is going through is also what the audience is going through. It's that shared empathetic response, or even a sense of sympathy, if not empathy."
>
> *-Lauren Gunderson*

The picture that emerges from the results above is that the emotional experience of audience members is rich and complex, and that physiological measurement of emotional response is a viable tool to explore the objective and subjective emotional responses of audience members during a performance. For the theatre company wishing to explore ways to create more meaningful emotional engagement with their audiences, this will be welcome news. As this was a case study, it is important to address generalization, or the expectation that other theatre venues will see similar results. The theatre partner, Hampstead Theatre, is a 373-seat venue in London and similar in many ways to other venues, and known for its history of producing American plays (Somerville). The demographics of its audience as of 2014 are reported to be approximately 50% attending from wealthy northwest London postcodes, and the remainder changing based on the show being produced (Mountford). The play, *I and You* was a U.K. premiere, and it is not known if originality influenced the results. The important point is, utilising a small budget and limited human power, any theatre company has the tools available to conduct similar research, potentially opening up new opportunities for both revenue and sustainability in the industry.

Audience emotional responses

Greater emotional response to the climax of the play

The results from the study show that experiment participants experienced a similar physiological and emotional response to a specific plot point, in this case the climax of Lauren Gunderson's play *I and You*. There are several possible explanations for this result. Participants may have experienced "collective effervescence", with emotions being strengthened by the act of sharing them with others ostensibly feeling the same thing, at the same time (Durkheim). This result links to existing research on choir singers who were found to sync their heartbeats during choral performance (Morelle). My thesis has speculated that watching a play is a comparable group performance for audience members, each playing a role in a shared ritual and in a group dynamic. Surprisingly, all participants reported experiencing emotional responses to the climax of the play. In a study with a larger sample size, it is possible that results would show more variety in emotional response.

Unexpectedly, one audience member experienced an emotional reaction so intense, their data had to be removed as a potential outlier. After transcribing the interviews, this person was found to have experienced trauma in their life similar to the emotional plot points of the story, sharing that they had recently lost two family members to a painful cancer. This finding suggests that there may be an association between life experience and greater emotional response. Theatre practitioners seem to know this is possible: it is likely the motivation behind offering "trigger warnings" during curtain speeches, warning audience members that extremely emotional topics

will be discussed. However, those are generic warnings based on the thought that a majority of audience members will find a specific topic emotionally triggering. Felner and Orenstein said, "no two audience members bring the same set of life experiences to a performance" (29) and we cannot know what life experiences audience members bring with them. Any aspect of a performance may be a trigger for someone. In reviewing the physiological data for this potential outlier participant, as well as their explanation of their emotional experience from the interview, I hypothesize that I have captured the moments of physiological response of a theatre audience member being "triggered" emotionally. This result is unexpected and has not been previously described. This leads to many unanswered questions. Did this audience member consider the event a trigger? Was the heightened emotional response valuable to the participant in some way (for example, did it help them to process their real-life experience, or do they consider themselves improved after seeing the play?). While additional research would be required to assess the full implications, it is clear that experimenters must proceed with caution. Intense emotional events potentially cause harm to mental and physical health (Schwartz et al. 631-639). And yet, as I have shown, a primary motivator for attending theatre is to experience emotions. This highlights an intriguing issue that audience members give permission to be emotionally manipulated in attending the theatre, even if the experience may lead to potential triggers.

Audience interest in exploring emotional response

Audience emotional reactions are of intense interest to audience members: they want to explore their emotional response more deeply through tools similar to those used in this study. Study participants also experienced emotional reactions to the study itself. Participants were extremely curious about their own emotional reactions to the play. Several participants asked

about their results during the interview process, with one saying, “I really want to know what the wristband said about what I was feeling”. Several participants also expressed privacy concerns, asking questions about what would happen to their physiological data once the study was complete. Two participants asked about the emotional reactions other participants had to the climax of the play. These findings suggest that audiences are intrigued by their own emotional reactions, and those of others to a play. Of note: several participants in the study attended by themselves, while others attended as a pair. Conversations about a performance often occur after the show (Walmsley), and likely include discussion of how audience members felt about the play. Audience members attending on their own lack a talking partner for deep discussion, which theatre companies may be able to address in creative ways, such as introducing solo audience members to each other to foster these discussions. This desire to explore emotional response may explain the intense interest in “what the wristband said about me” and may further indicate a wider audience interest in attending theatre that includes an emotional measurement component, as well as, potentially, increased communal emotional moments.

Expanding on this idea, while I advocate that now is the time theatres should be focusing on emotional engagement, I suggest that the process of helping audience members explore their emotional response to a theatre piece may be the start of a new form of audience engagement, if not a whole new form of theatre. Similar examples exist: the phenomenon of “scratch night” performances in the U.K. have evolved to employ specific rituals and group dynamics to provide playwrights with feedback on new play development (Jane). I posit “Feel Night” performances would draw out new audiences interested in learning more about their emotional response to theatre, while creating a new revenue stream for the theatre company.

It is also possible that drawing more conscious attention to what an audience member is experiencing emotionally may influence the emotions felt. This is the "observer effect" which says that the act of observing a system changes the system in some way and is usually portrayed as an obstacle to experimentation. But the observer effect is not inherently negative (Monahan and Fisher 357-376). I submit that the act of participating in emotional experimentation, including the reflection of emotions being felt, the wonder about what emotions were captured, and the processing of the results and what those results mean to the participant are in fact a new method of audience engagement. This engagement may bring several benefits, such as increased attendance to the theatre, increased revenue through those additional ticket sales, a deeper, more meaningful connection to the work, and potentially a differentiator for a theatre company in competition with other venues for public attendance and repeat customer loyalty.

Physiological measurement as a method for exploring theatre audience emotions

Issues with physiological measurement in identifying discrete emotions

Physiological measurement is a viable method of understanding the emotions of theatre audiences, however, identification of discrete emotions by physiological data alone is not yet reliable, and instead requires a mixed-methods approach. As I have shown, the state of the science of physiological measures is that discrete emotions are hard to predict with biometric data alone. In designing this study, my desire was that by selecting equipment capable of measuring multiple channels of physiological response, the identification of discrete emotions from physiological data alone would be possible. However, the results were not encouraging.

Using the channels of skin conductance, heart rate, and skin temperature via the Empatica E4 wristband, participants generated similar physiological data, but only the use of the self-report questionnaire and follow-up interview allowed for verification of physiological data by the participant stating in their own words what emotions they had felt. An implication of this is the possibility that physiological data capture, in its current state of development is better suited to either 1) focusing in on specific plot points of a play, backed by the inclusion of self-report, or 2) focusing on emotional response over the full run of the play, but only measuring arousal. As I have described, improvements in technology, such as the layering of many physiological measures into one equipment/system, or the ability to utilize facial expressions in a darkened theatre space will likely change this implication.

Equipment options for measuring physiological response

The options available to measure physiological data in the marketplace are extensive. After exploring several systems (see Appendix 3) I selected the Empatica E4 wristband sensor. Research has validated it against other more established sensor systems (McCarthy, Pradhan and Adler 1-4), and the portability of the system for use in a theatre space is a strong benefit. However, the software supplied with the equipment lacked the ability to compare data from multiple participants, which was a key aspect of the study. Data was exported from the wristbands for manipulation in Excel and SPSS ver. 28 software, but due to the amount of data captured per participant, even for the 90 minutes of the selected play, the dataset was unmanageable. Data needed to be averaged to reduce size and complexity, so that it could be analysed in SPSS. This need to manipulate data may be a significant obstacle for some theatre leaders wishing to experiment with physiological capture systems. I have shown that it is

certainly possible to do, especially for theatre companies working with experienced researchers. But theatre companies without the capacity and skillset for manipulating data at this level would benefit from 1) Sharing all aspects of their methodology and the results they want to achieve with vendors of physiological capture systems and 2) verifying with each vendor that their system has everything included that is needed to achieve the intended results. These two steps will dramatically reduce the probability that a theatre company invests in a solution that, when encountering the "fine print" lacks the functionality to accomplish the research objectives.

Superiority of skin conductance

Although this study utilized three measures of physiological response (skin conductance, heart rate, and skin temperature) it is clear that skin conductance (GSR) most clearly addressed the questions posited in the research. This finding broadly supports the work of other studies in this area, which have found GSR to be a good measure for use in the theatre (See Geelhoed et al., Wang and Wang, Wu, Chen and Huang). GSR sensors are inexpensive, easy to acquire, and seem to be well tolerated by participants. One important note is that the standard for measuring GSR is to use sensors connected to the fingers, due to the higher concentration of eccrine sweat glands. While not seen in this study, wristband systems may suffer from more connectivity problems due to the lowered number of eccrine glands on the wrist.

The heart rate measure also proved to be valuable, showing a statistically significant movement (in this case, a decrease) for participants at the climax of the play as compared to two other sections. Although participants most often reported feeling surprise and sadness, linking a decreasing hart rate to these two emotions is problematic, as past studies disagree on the

association (Kreibig (401) found that decreasing heart rate is often seen for sadness, but Larsen et al. (180) reported the opposite. Again, the inclusion of the self-report in the methodology adds the clarity missing from the lack of physiological specificity.

Temperature data was successfully captured for all participants, but results were more difficult to interpret. Participants all showed a significant movement (in this case, a decrease) at the climax of the play. However, it is important to note that skin temperature is susceptible to influence from a variety of outside factors in ways that do not influence heart rate or skin conductance. The proximity to other people sitting next to you, the number of bodies in the theatre venue, use of heat-generating traditional bulbs in stage lighting (vs. heatless L.E.D. bulbs) and air conditioning or heating in the building are all potential factors. Future research, controlling for these conditions, should be undertaken to further investigate the viability of skin temperature as a physiological measure in the theatre under differing conditions.

Impact on the theatre company

While I have shown that experiments such as these can be accomplished with relative ease, it is important to recognize the impact of such work on the theatre company. The Hampstead Theatre proved to be exceptional partners in this research. Yet, it must be noted that conducting experiments during a performance creates a burden for the theatre company, and this has not been noted in other studies. There are logistics to be worked out, communications to be designed and sent, negotiations to be had and permissions to be granted, all in advance of the research. On the research day, audience members need to be met, briefed, outfitted with equipment, and escorted back to the staging area for follow up activities at the end of the

performance. All the while, audience members not participating in the study may be curious as to what is happening, and modifications may need to be made to the plan based on late starts, issues with equipment, or no-shows from participants. Stage managers, being the amazing individuals they are, will likely have no issues making it all happen, but these extra efforts still consume capacity, human effort, and focus which may reduce those resources available for the actual performance. I advise those planning their own experiments to design with flexibility in mind, so that the art and experience are always prioritized to receive the resources to succeed.

Acting on the Results: The Emotional Engagement and Capacity Scale

This findings in this study provide evidence that audiences are keen to know more about their own emotions and may welcome the opportunity to explore this as part of their theatre experience. This should excite, not alarm, theatre companies, even those with extremely limited capacities to engage with audiences in this way. This process, which I suggest naming *Emotional Engagement Design*, should be managed by a senior staff member, such as the artistic director. This person will design, measure, and report on the emotional experiences of audiences on a micro level per production, to a macro level of a full season. The emotional experiences of audiences should be included in ongoing audience research plans, so that longitudinal data may be explored. Theatre companies wishing to augment the emotional connections their audiences need not use sophisticated technology at all – all that is needed is a willingness to help audiences explore their feelings. To this end, I have created a simple visual tool theatre companies can use in the design of their emotional engagement activities, called the *Emotional Engagement and Capacity Scale*:

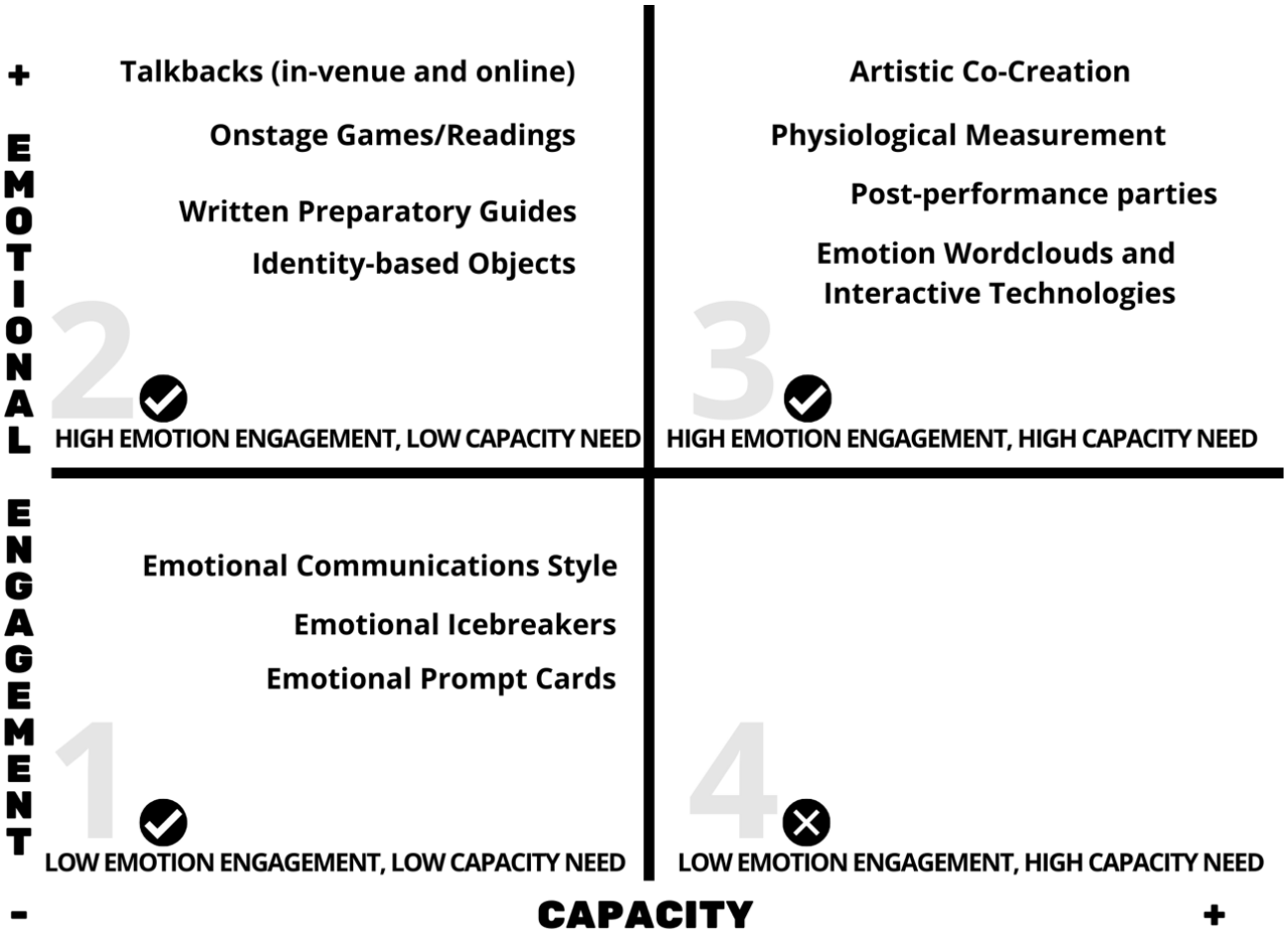

Fig. 6: The emotional engagement and capacity scale

Any emotional engagement activity can be mapped on the tool, based on the activity having a low or high expected emotional engagement, and a low or high expected capacity drain on the theatre company. As theatre leaders innovate ideas for emotional engagement, they should be mapped against the quadrants to see where they fit. In Appendix 4, I have provided sample emotional engagement activities. Theatre companies just starting out may wish to experiment with activities from quadrant 1: low emotional engagement, low-capacity needs, as these are activities that can begin an emotional conversation, but require little in capacity to implement.

An organization may then wish to proceed through quadrants 2 and 3 as capacity builds. Activities that a theatre company rates as low emotional engagement and high-capacity need (quadrant 4) should be avoided. There are a variety of reasons theatre companies should work toward expanding their emotional experiences, such as helping audience members to:

- Live longer in the world of the play (increase their time in the offering)
- Understand the perspectives and feelings of "the other"
- Have a safe place to unpack their own feelings about personally difficult subjects
- Simply have an emotional experience without pretence or added depth (people ride roller coasters to feel fear.)

Measurement of arousal will lead to theatre designed for arousal

These new technologies and capabilities also have the potential to be misused. Past studies have shown that theatre creators are interested in knowing what parts of a work get the most reaction from audiences (Latulipe et al. 1850) and this may lead some creators to optimize theatre strictly for arousal and emotional response. I can see many people who believe in a traditional form of theatre becoming alarmed at this development, but the beauty of theatre as an art form is that it is flexible and adapts over time. Creators should be encouraged to experiment with making "arousal theatre" as a new flavour of theatre experience, which may have unexpected benefits, such as increasing the interest in traditional theatre.

These strategies are especially applicable to improving the emotional experience of digital productions.

As I have shown, although the COVID-19 pandemic accelerated theatre companies' usage of streaming and virtual production technologies, these experiences fall short of the rich social group experience of attending a play in a venue. I have argued that virtual productions would benefit from efforts to increase the sense of group presence and theatrical ritual, and emotional engagement should be considered a path to accomplish that goal. Results from experiments I have completed studying virtual talkback experiences show that audiences are drawn to, attend, and appreciate these opportunities (Evans) and yet, the virtual talkback is a rarity in the theatre sector. Specifically, additional research should explore hybrid theatre productions that have both an in-venue and virtual component, with measurement of emotional response happening in both offerings simultaneously. This would provide virtual events with a baseline of emotional response to use as a tool to increase emotional response over time.

7. CONCLUSIONS

> "If you want to change something by Tuesday, theater is no good. Journalism is what does that. But, if you want to just alter the chemistry of the moral matrix, then theater has a longer half-life." — *Tom Stoppard*

The aim of this interdisciplinary study is to provide theatre leaders with new, actionable strategies to reverse the decline of theatre attendance. The results from this exploration show that prioritizing the emotional experience of audience members through emotional engagement is a solution that drives repeat revenue, thus increasing organisational sustainability. While improving the "bottom line" for the industry is always important, audience members are the ones who most benefit, through their richer and more meaningful theatre experiences.

Returning to the first of my research questions posed at the beginning of the study, my research has established that audiences experience increased emotional response during specific plot points where the playwright expects such a response. Results from the case study illustrate that at the climax of the play, audience members experienced significant emotional response as compared to two other sections of the play. Playwright Lauren Gunderson describes the effect as a "gasp" that she listens for each night during the final scene. The research undertaken here was successful in capturing the emotional backdrop to that gasp.

Addressing the second question, it is clear that physiological measurement is a viable method for understanding the emotions of theatre audiences, to a point. It is clear that as of now, research into emotional responses at theatre shows still requires a subjective component, such as

a self-report method, allowing participants to put their emotions in their own words. While the ability to predict felt emotions strictly from physiological response is not yet reliable, the mixed methods approach used in this multi/interdisciplinary study created more robust and useful results. My concern with "viability" here also extends to a theatre company's capacity to implement this type of research. I have shown that emotional engagement activities range from simple and inexpensive up to the complex and requiring significant resources. But there is a place for theatre companies of every size in that range. All it takes is the desire to focus on increasing the emotional experience.

Third, it is now clear that the potential benefits of prioritizing and expanding the emotional engagement of audiences is worth investment of time, capacity and resources. The findings clearly indicate that when it comes to reasons why people attend the theatre, emotion is foundational. Emotion positively influences intention to return, provides a safe transference to other perspectives, impacts behaviour change, and cements social connections as part of the shared group experience. This study also found that audience members are intensely interested in their own emotional response to theatre, suggesting that new emotional engagement activities, and potentially even new forms of theatre based on emotional response are ripe for exploration. With all the evidence pointing to the benefits of emotional theatre experiences, theatre leaders should make emotional engagement a cornerstone of every aspect of operations, from the volunteer staff to the board of directors.

These findings make several original contributions to the literature. This study is the first to show that theatre audience emotional reactions to a specific scene match the expectations of the playwright, through a mix of objective and subjective measurement systems. It also may be the first study to successfully capture physiological data during the moments that a theatre

audience member is experiencing a "triggering" emotional response. The study has identified that participants are interested in exploring in more detail both their own emotional responses, and those of others. Additionally, this study is unique in its design to assist non-academic leaders of theatre companies to begin their journey of emotional engagement. To this end, seven novel resources have been created:

- A literature review of all known studies measuring physiological response in a live theatre venue
- A seven-step framework for physiological measurement in the theatre, designed to help theatre companies avoid costly errors when planning original research
- *The emotional engagement and capacity scale*, which provides theatre leaders with a simple way to balance organizational capacity against expected emotional results
- A questionnaire of individual emotional response, which can be used to quickly capture emotional response at the interval or after a performance
- A phone interview script, which can be modified to gather memories of emotions felt after the audience member has begun to make meaning of their experience
- A comprehensive list of consumer-based equipment available for emotions research, which includes pricing and contact information for each vendor
- A custom Excel macro for averaging data

The results also support existing literature that has found that skin conductance is a low-cost, effective method of measuring physiological response, that biometric measurement equipment is well tolerated by audience members, and that identifying emotions by physiological measurement alone is unreliable.

With regard to the research methods, some limitations need to be acknowledged. The sample size of the participants was small, and while the selection of participants was random based on previous ticket purchase, no demographic information was gathered. Due to the cost of the Empatica E4 wristbands used, a limited number could be implemented in the study, and required borrowing bands from other university researchers. However, less expensive equipment is available and is reducing in cost as the market matures. Future research would benefit from a wider view of participants, and a better understanding of how participant demographics does or does not impact emotional response.

Second, the study did not evaluate data over multiple performances. Although each performance is different, and the ideal situation would be to have all participants experience the exact same stimulus, important data may have been gained by reusing the bands over multiple performances. This would have added additional burden to the partner theatre company. However, overcoming this obstacle would begin to explore the relationship that a specific performance has on group emotional experience, as compared to the run of a production.

Third, subjective self-reporting data was only gathered at the end of the performance. While this provided valuable validation of the physiological data captured at the end of the performance, this design did not provide the same validation for physiological data captured during the other two sections of the play, a focus for a future study.

While the results have provided important insights into the emotional experience of audience members, it has also uncovered new questions for future research. There is abundant room for further progress in determining:

- the relationship between emotional life events an audience member has experienced and the reaction to watching similar story developments in a play

- the potential for layers of physiological measures to predict discrete emotions being felt by audience members
- audience member interest in attending theatre experiences that provide new levels of access to one's emotional responses
- the potential for emotional engagement activities to increase interest and attendance to virtual theatre experiences
- how physiological measurement may be used during the playwriting process to create new works as hybrid experiences

An overarching conclusion from this research is that the emotions experienced by audience members are key, but research is lacking. Audiences enjoy "catching feelings" at the theatre, benefit from them in many ways, and potentially learn positive behaviours as a result. They have done this on their own, while theatre producers have traditionally focused their efforts on marketing for financial return on investment. The theatre venue is a sacred, shared social hive, and one of the last spaces available where people can feel safe to explore ideas that are different from their own. History has shown that emotion and theatre have been used to influence society, often negatively, for millennia. I have shown that all the ingredients needed to successfully expand theatre as an "empathy gym" exist and are readily harnessed. The pivot from "selling tickets" to "providing emotionally engaging experiences" starts with a single question, which should be asked at all levels of the theatre organization: "How can we improve so that people will experience a stronger emotion?" Taking this statement as a standard for effective theatre practice will innovate audience participation and loyalty. What follows will be dramatic increases in reputation, repeat attendance, and revenue, as audiences explore ever more meaningful emotional experiences at the theatre.

APPENDICES

Appendix 1: Interview with Lauren Gunderson

Ron Evans: Thank you for agreeing to be interviewed, Lauren! When you're initially writing a play, how does the potential feelings of the audience come into play… How does it influence your writing? Do the characters just have a story, and they work through you, or do you plan out a pattern for sadness, relief of sadness, that sort of thing?

Lauren Gunderson: Yes! A lot of things are conjoined purposes. Writing a story that allows the characters to reach their full potential, pushes them, and challenges them will also do that for an audience. So, the empathetic quality of the theater-going means that some version of what the character is going through is also what the audience is going through. It's that shared empathetic response, or even a sense of sympathy, if not empathy.

Ron Evans: Maybe catharsis, depending on the play?

Lauren Gunderson: Absolutely. Yes. That is the goal. Now, there isn't catharsis in every scene. It's usually once or maybe twice in the whole story, and it's at the end. But I certainly do think of the audience. And for most of the show, if you were to stop at any moment, I could tell you what I have intended for the audience to feel.

Ron Evans: Keep that in mind. I've got questions about that!

Lauren Gunderson: Yeah! There are plays of mine that are much more structured for that and some that are much more moody. I have a sense of when you enter the play -- in the first couple of minutes -- your ears should be very attuned because we're all trying to figure out how to watch this play. What are the promises? What are the expectations? The simple version is: if it's a comedy, you should laugh pretty loudly in the first five minutes. And if not, it's going to be hard to get them to laugh later because the audience is thinking, "Oh, I thought this was a play we didn't laugh that loud… Oh, no it is? Okay." It's also fun upsetting those expectations, too. If it's very funny and then becomes very dramatic… that's a fun thing. But again, it's fun for me if it's intentional. If it's accidental, that is a mistake on my part. The short answer is: I am always thinking of the audience. I became a playwright partly because I liked being in an audience. I was writing for an audience of "me," first knowing that if it made me feel and think, it would probably make someone else do the same. So I always think: "What is the experience of watching this?" Which is very different than the experience of writing it because you don't get surprised, you don't have a gasp. I design for surprise, and I design for a gasp, but I don't get to feel those because I see it coming.

Ron Evans: Is there an assumption that the emotional seed that you plant sprouts the same kind of emotional experience for most people?

Lauren Gunderson: Yes. I would say certainly not 100%, but a general majority. And sometimes it is age based, like when I'm writing plays for families, knowing that younger audiences will be there, it's a very different kind of set of emotional physics.

Ron Evans: OK. Let's be clear that you're thinking to yourself "Most people are going to chuckle at this, and some people are going to heavily guffaw, and somebody might frown at it, but nobody's going to get the opposite reaction to it." There must be some majority influence or a

sense that a large group of people will react the same way, right? Do you think about the ultimate end user or the person that would be most affected?

Lauren Gunderson: It's a fabulous question. And of course, the truth is everybody's going to react differently, and it means something different to every person. Now, those differences can be quite nuanced. They can be very similar. Sorrow is kind of similar no matter what the specifics of your life have been. Betrayal feels similar. Heartbreak. Triumph. So, there are baskets of things that we all usually come into contact within our life and pull from. I think for "I and You," what's interesting is a 16-year-old watching the play will probably connect with the character of Caroline in a different way than a 45-year-old mother of a 16 year old will. So, the mom looking at that would be like, "Oh, God, please take care of yourself, kid." Where the 16-year-old is like, "Yeah! Break all the rules! Get out of there!"

Ron Evans: There's something for everybody there.

Lauren Gunderson: When you get to know these characters and that first little sparkle of love kind of happens between them, both the mom and the daughter should be leaning in going, "Are they... Is that? Are they going to... Oh!" If the writing and the directing and the performance and design are all doing their best job, then those big emotional peaks and the tensions that result from them should brush away a lot of different background. That audience member who is 80 and somebody else who is even eight would probably go, "Oh. I'm so sorry that Simba lost his dad. I feel really bad, and I hope he's okay." That's a very weird example, but you know what I mean.

Ron Evans: So you're saying the lens to which someone interprets what they're feeling is individual, but the feeling taps into a limited number of larger group feelings that people

experience every day. They say "Oh. I've heard of a story like this, I'm not lost." That's interesting.

Lauren Gunderson: It's almost like sense of absorption, like if the play is really good and the pace is moving and things are happening, and it's funny or it's harrowing. You kind of forget yourself a little bit. I mean, you're always there, but if the play is doing its job and it is sparkly and it is interesting and compelling, you lose yourself in it. That's when we all start to align emotionally. We've all seen bad Shakespeare, right? I am not listening to the story. I don't really care. I'm thinking about my grocery list or I'm thinking about, "This is bad acting." I'm not in it. But if it's good, then suddenly -- say you're watching Ian McKellan as King Lear -- then I don't know anything about being an old man, but I think, "Oh my God, I suddenly do know what it's like to be an old man. And I feel for him, but I'm also mad at him." Anyway, so the idea of this is not always the same because not every production or performance is hitting. That's stuff that I can't control as a writer, but in the play in my mind with the best productions and performers and designers all working, it should work in the way that I have designed it.

Ron Evans: The focus of my research is studying how people have the types of reactions you describe, in real time. There have been many attempts to measure emotional response. One of the early ways that people measured emotional response to things they saw on T.V. was by turning a dial. If you were feeling, "I really like this part" you would turn the dial up and you'd turn it down when you didn't like something. But they found that when people were truly engaged, they'd forget to turn the knob at all. So that method won't work for us. Another popular methodology is to ask people what they are feeling as they exit the venue via a survey. But that is problematic, because you might remember the strongest or most recent emotion that you felt, but not the whole journey of what you felt. That's why I'm exploring measuring emotions via

physiological response. We can see skin temperature, heart rate, and skin conductance changed over time. How might these changes map to a narrative arc of a play? These are some of the questions I'm exploring. To that end, when you are refining a play, how do you measure the reactions of the first audiences to see it? Do you follow along on the script and listen for the laughs? Are you actively polishing the script at that point?

Lauren Gunderson: Usually, we don't have big audiences until later on. So the first, second, third, and fourth draft is probably more of a closed room with just actors, some colleagues like a dramaturg, the director of course, and maybe some members of the theater if they're commissioning it. I really don't ever bring in an audience until later, partly because the play is not ready. It wouldn't be helpful to have an audience say "Yeah, that's not clear yet." It's only when I feel satisfied, and the director, dramaturg, and actors feel like, "Okay, yes. We're ready." Also, the reaction to a reading is different than the reaction to a production because obviously design and sound and costumes answer a lot of questions -- way more than an audience might think. It really is waiting until the production is ready. Then I can properly gauge, and the audience can properly have a real experience of it. And by audience, I generally mean people I don't know personally. Now, there are many people who I will bring into the process earlier because I trust their taste, and I know that they know me. The previews are really telling, and they can also be a little misleading because audiences are different, and some, I mean, ask any performer, and they'll be like, "Oh, yes. There are "laughers." And there are "no laughers." There are wiggly audiences and check-your-phone and check-your-program audiences.

Ron Evans: And there are the people who are slowly unwrapping their candy over a whole act.

Lauren Gunderson: Yeah. There's always those! You kind of get a sense, and usually after scene one, you'll know, "Okay, this is a great audience," or, "Damn it, they're so quiet. Oh no.

They had too much wine at dinner." You have to judge a little bit. There is no perfect kind of case study.

Ron Evans: Do you act, as well?

Lauren Gunderson: I did when I was much younger. I don't really do it that much now. I have done a little bit of mainly things I have written, but not much.

Ron Evans: The only reason I ask is because an actor can feel that up on stage – if an audience is quiet and listening or quiet and tuned out. It's very interesting, and I was curious if you, as a playwright, learned that sense from acting, or if you naturally have that ability to read energy when you're not up on stage and being looked at. And right now, everybody is masked, and I'm wondering if that makes a difference in being able to read that energy.

Lauren Gunderson: Oh, totally. I'm sure they do. There's a muffling of the sound, and we have trained our ear as actors and writers and directors. If you're writing a big ol' comedy, and you get the "heh heh heh" versus the "BAHHAHAHA," there is every manner of laugh, and after doing this work for 20 years, I can tell exactly where the laugh is coming from, who's really into it, who things it's dumb, and who thinks it's great. And sometimes you both laugh for both reasons. You laugh if you're nervous. It's a wild human psychological parade, and it's funny. I tend to write shows that start out very bubbly and frenetic and fast and funny and then kind of settle into, "Oh, this is getting real." They livestreamed "I and You" on Instagram because Maisie Williams has a big Instagram following. The filmed version was beautiful except there was no audience. The performance was extraordinary, and the cinematography was beautiful. But it did not feel like my play because there was no one laughing. And the jokes felt kind of weird if there's no one there to respond. I'm all about masks, all about vaccines, sure, absolutely. But it really does change the work. Would it change the response to Hamlet? Probably not. Would it change the

response to "I and You"? Yes. Would it change the response to a musical? It's a very interesting situation that we're in. The truth is, I always love a very vocal audience, but not everyone is. And sometimes, there have been productions that feel just dead quiet the whole time, and it feels like, "Oh my God, they hate it."

Ron Evans: I've played to those audiences.

Lauren Gunderson: But then they're the first ones to their feet for a standing ovation at the end. So sometimes they're quiet but into it, as you said. And there are other indicators. My husband taught me this word in biology: the word is "honest indicator" and that sense that laughter can be an honest indicator, but it can also be, especially regular theatergoers know when something is supposed to be funny. So oftentimes, they'll give the laugh even though it's not quite earned, and you can definitely tell the difference between the like, "eh heh heh heh", kind of laugh like, "Oh, I know Petruchio is supposed to be funny, but he didn't actually make me laugh, but they're setting it up like they should." Versus a really great performance of "Much Ado" where you're like, "OH MY GOSH!" But I think a gasp is way more of an honest indicator than a laugh. So that's part of why I think "I and You" is my most successful play structurally, because I know exactly every night where those two gasps come from. Every single night, it is clockwork, and I can "boom" and "boom."

Ron Evans: Okay. Let's talk about it. Tell me. I know the second one. Tell me where the first one is.

Lauren Gunderson: The first one is in the second act. They're right next to each other. You get two pieces of information very quickly: about 60 seconds apart, I think. I haven't measured in a while. And that's part of structuring that earlier in the play he's very emotionally telling this story about the basketball court. So, I'll put a lot of energy in a big emotional spotlight on him then so

that all I have to do is say a few words, and the audience gets it. And then a few seconds go by and the audience is much like Caroline. Caroline is experiencing the same thing. She gasps when we do. And then you get a gasp every night and it is the greatest feeling on Earth.

Ron Evans: Okay. So it's a two-part reveal from what you're saying. And you have to have a backstory to get to that reveal. You must make that investment to get up to that place, and there are smaller beats throughout that are just funny and lots of other things going on. Is there any other section more towards the front of the play that you expect the audience to have any specific reaction to?

Lauren Gunderson: Yes. There's usually a reaction when he says that the project is due tomorrow, which is at the end of the first scene. He says "We have this project. Please do the project with me." And we're all like, "A project? Ugh." And then when he's like, "Yeah, so it's due tomorrow." And she's like, "What?!" And the audience usually has a reaction. And in the second scene, when they're talking about Walt Whitman being sexy, that there's sexy stuff in the poem, and they read it together. And the float and odour of hair. They quote Whitman, and there's a moment where it's like, they're kind of right next to each other and they're talking about sexy things, and we're thinking "Hmmmm." Most of the audience should have a sense of "I'm not breathing until I know are they going to... Okay, now they're talking again."

Ron Evans: Ahh! I wouldn't have picked that. That's really good to hear from you. One part of "I and You" that always gets me is when the Coltrane music is playing, where you just kind of get lost in the beauty of a moment, and you're hearing the music. I don't think you're consciously thinking, "Wow, it's really beautiful that somebody is expressing themselves about something they care about that's positive," especially nowadays because everybody expresses what they hate. But here's somebody who's being vulnerable and saying "this is really beautiful to me."

And the lights fade, and it's a moment that has always stood out to me. It just feels larger than life in that moment, as these characters share a moment with a beauty that is bigger than them.

Lauren Gunderson: Yes. I think that moment is definitely designed to transport the characters as well as the audience into a hopeful, positive, easy future that certainly Caroline does not feel like she's ever going to have. So, it should have this tinge of youthful hope but also a kind of gravity like, yeah, it's probably not going to happen, which Caroline says later. She's like, "Yeah, that's not going to be my life." Truth is that it will.

Ron Evans: On that romantic moment, it sounds like you're expecting people to feel kind of a tittering sense of hopefulness like wanting these two to get together matchmaker style?

Lauren Gunderson: Mm-hmm. Yep.

Ron Evans: At the end of the play, there is a surprise reveal. What are you expecting people to feel then? Besides the gasp of surprise.

Lauren Gunderson: I don't know if it's one thing. I think...

Ron Evans: It could be multiple things?

Lauren Gunderson: Yeah, I think it feels good because it is multiple things. I think some plays feel unsatisfying or too simple, like, "Oh, it all worked out." Okay. But if you feel like, oh my God, and no!" It's like it should hit in waves of, "Ah! No. Yes! No. Oh no! Yes. No!" I think that's part of the overwhelm of a cathartic feeling at the end. That's a lot of feelings. The overwhelm of it; the spill over. I feel like that's what "I and You" is trying to be: it's not a simple feeling. That kind of feeling of catching up to something. So yes, there should be acceleration. The information starts coming quickly. This… the basketball court, the list, and this, and I've got to go, and you've got to do this, and then there's music, and then there's this, and then your

mom… and it's gone! It should feel like runaway train energy, where the rest of the play is clippy, but it's like, "Hmmmm. We're fine. We're not running out of time." The running out of time of it is also part of it. Right before that, we had this kind of funny release when she kisses him after the presentation. So that's a kind of giddy: "Oh! They kissed!" It feels like at the beginning of something.

Ron Evans: It's hard to put these things in words.

Lauren Gunderson: Yeah.

Ron Evans: Emotions… to apply words to them is a poor representation of what it actually feels like. So we hunt around for these words… like “there's a giddiness.” It's hard to put those into words.

Lauren Gunderson: Yes. And it's certainly the answer to tension. A kiss is usually the release of tension, even if it's a hot kiss or something. It's like, "Okay, great. They're getting started." You know what I mean? Whereas, I had a great acting professor when I was an undergrad say that it's the moments before the kiss that are the most exciting, because that's where the tension is. It's the "Are they going to? Are They Going To? ARE THEY GOING TO?" And then as soon as they do, you're like, "Okay. It's over." Even though you're enjoying the kiss, you're like, "Great, good for them. All right. What's next?" So it's the lead up, the lead up, the lead up, the lead up. “I and You” is basically a lead up for the whole play. “Are they going to?" So then there's a satisfaction with the kiss, but what's also different, and I think we're too deep in the cathartic reveal at the end for this to have a response, but I always say the point of “I and You” is the hug right before he disappears. It should be this huge, have them run-to-each-other hug because that's different than an awkward kiss or a little touch or even when he hugs her after she has her kind of physical panic attack.

Ron Evans: That's a friend hug.

Lauren Gunderson: Yes. Those are all different ways of touching, but that hug at the end should be fearless, desperate, urgent, full body, "I'm not going to let you go until the universe rips you away from me." So that's...Yeah, that's the final agreement that, "I need you, you need me. We're doing this together."

Ron Evans: It's so wild. And I see your science background there in so many ways. It's just fantastic. Maybe it's good to just also leave it open and just say at the end of the play, we expect that you're going to feel… something. And that might be open to your own interpretation, but then you probably, ideally won't be checking your phone, right?

Lauren Gunderson: Well, and I will say, there is a bit of a trick with this play that may be related to age-ism or sexism or something, but there are some people, usually older men, who might see this play and feel tricked, and they don't like being outsmarted by a play, certainly a play by a lady. So there's been a lot of, "Ugh, the play relies too much on the twist at the end, the trick, the switch-a-roo," or whatever. I just say that because the feeling some people might feel is "mad." Sometimes there is a rejection of it, and I think the rejection is actually a compliment because it means the play worked. They just like to be ahead of plays or to outsmart a play. And if it worked, that means that I outsmarted them. These people don't always like that. Some people do like it, but some people don't. So just there may be a different reaction from some people.

Ron Evans: Interesting. I will be cross-referencing their physiological data with what they said in post-performance interviews, but you're already answering part of this question. Everybody feels something, hopefully. I felt loss. Some people feel happiness, and some people may feel anger.

Lauren Gunderson: Yes.

Ron Evans: And there are all reasons for all those feelings. Interesting. Theatre has had many forms over centuries… thousands of years. We've talked about catharsis and Aristotle. With "I and You" or your work in general, where do you see your work connecting into to the diverse history of styles of storytelling and theatre?

Lauren Gunderson: Hmmm. I don't know if I can totally answer that. As far as "I and You" goes and several other plays of mine, I love a twist. I love an actual surprise. I feel like in theatre, we think we surprise people, but we don't. It's usually that we see it coming. We know the secret that's going to be revealed. It's just a matter of when it happens. We know they're going to fall in love. It's predictable. And predictable can be wonderful and lovely, and there can be little surprises along the way. "Oh, he said no instead of yes." Whatever. And so I endeavour to have a play where the surprise and gasp that comes with a true surprise is one of the most honest reactions you can have, if earned. That is one of the things that I quest after: the switch to "OH, THAT'S what's going on." It's the "I see dead people" of it, right?

Ron Evans: Yes!

Lauren Gunderson: Movies and TV do it really well. "Game of Thrones" kills off random main characters, and you're like, "What?! No!" Theatre does not do that. We don't do that. And I wish we did. Not every play needs that twist, and many of them I write do not have that. But some do. And I find that reaction… that's when an audience snaps into collective focus, and that's when you can tell, "Oh, this audience is all getting in at once." There's another moment in a play of mine called "Silent Sky." The whole thing is about early astronomy where they use glass photography. There's a moment when he basically says he has a fiancé, and they've kind of been flirting the whole time, and she drops this very valuable glass plate. And I swear, every time, the

audience is just horrified. It's so honest, and it's every single audience, every time, as long as she actually drops it and you hear the crunch. It's stuff like that: earning those moments, not forcing them, and not throwing them around every five seconds. But a well-earned moment to me is one of the most satisfying things as a writer and an audience that I can do, and I think it feels really great for actors, too, because you know you've *got them*. Oh, you are *mine*.

Ron Evans: I've felt that feeling as an actor. It's amazing. Did you find a difference between U.S. audiences and U.K. audiences as far as their reaction level?

Lauren Gunderson: Not really.

Ron Evans: The U.K. has never seen "I and You" before, unless they travelled to the U.S. to see the play, which is one of the reasons it made so much of a stir. Thank you, Lauren. I think those are the questions I have for you for now, and I very much appreciate your time.

Lauren Gunderson: Yeah! Thanks for everything. Let me know what I can do next. We'll talk soon then!

Appendix 2: List of Physiological Measurement Equipment

Multi-Systems

- http://www.myfeel.co/ — monitors electrodermal (GSR), blood volume pulse, skin temperature, plus GPS system (showing the happiest places in the world for example?) $299
- https://www.empatica.com/e4-wristband — Wristband that measures Blood Volume Pulse (Heartrate variability), motion, Galvanic Skin Response, skin temperature $1,690
- https://omsignal.com/pages/omsignal-bra — OM Bra, measures heart rate and respiration in a smart garment
- http://www.hexoskin.com/pages/health-research — wearable smart shirt that measures ECG, heart rate variability, respiration, and acceleration in space
- https://www.indiegogo.com/projects/zenta-stress-emotion-management-on-your-wrist#/ — ZENTA measures heart rate, GSR (currently asking for funding on IndieGoGo)
- Apple Watch — https://techcrunch.com/2016/04/08/emowatch-is-happy/
- http://www.inc.com/magazine/201607/tom-foster/lightwave-monitor-customer-emotions.html Lightwave — a software and wristband system that has been used for real-time events (heart rate, GSR)

  http://angelsensor.com/ — Wristband that offers real-time API to heart rate, PPG, skin temperature, steps, sleep quality, calories, acceleration, and orientation

Heart Rate Variability

- https://www.zensorium.com/being#parameters — heart rate wrist monitor that says it understand emotions from heart rate variability
- http://www.sensoriafitness.com/ — Device worn on shirt to measure heart rate http://emvio.watch/ Watch that measures heart rate variability

Galvanic Skin Response

- http://www.moodmetric.com/ — mood metric ring, measures stress levels by galvanic skin response, reports back to an app. $229
- https://thepip.com/en-us/science/ — Small device that the users places his/her finger on, Measures Galvanic Skin Response.
- http://www.xoxemotionaltech.com/ — wristband and platform using GSR (I believe) and has successfully measured 2000+ people in an audience
- http://www.shimmersensing.com/shop/shimmer3-wireless-gsr-sensor — Wearable, portable GSR sensor suite, 400 pounds

Respiration Rate

- https://www.spire.io/ — Measures tense, focused, calm via a small device worn on the shirt, measures respiration rate $129.95

EEG

- http://emotiv.com/insight/ — Measures emotional response using 5-channel prosumer EEG system
- http://www.choosemuse.com/what-does-muse-measure/ — MUSE headband measures meditation response via EEG apparently — info scarce on site. $240.99
- http://openbci.com/ — opensource EEG project

Facial Recognition

- https://www.kairos.com/crowd-analytics-sdk — Company that offers an SDK to develop a "crowd analytic" device for looking at many faces in a crowd, along with age and gender (not race). Very interesting, has low pricing (free options too) and wants to work with academics
- Infrared facial recognition
- http://www.affectiva.com/solutions/affdex/ - Product called AffDex
- http://ellen.technology/en/# — Another facial recognition engine

  http://www.nviso.ch/ — Another facial recognition engine

Thermal Imaging

- http://www.xbox.com/en-US/xbox-one/accessories/kinect — Kinect, has heat sensor that people have used to measure where in a crowd people are not moving much

Eye Tracking/Pupil Dilation

- https://pupil-labs.com/pupil/
- http://www.tobiipro.com/

Blood Pressure

- Too many to name, not that useful for emotions research

Kinesthetics

- https://www.myo.com/ — Armband that measures movement (applause?)

General Software Tools

- https://sensum.co/ — Seems to be software that you can run emotional studies on, using consumer devices

Appendix 3: Emotional Engagement Strategies Template

In-venue emotional prompts for audience members

Audience members may be reluctant to interact with people they don't know who are sitting around them, but when provided a prompt to do so, will readily engage in conversation. During both pre- and post-show curtains speeches, I have often asked audience members to raise their hands if they are new to the theatre, and then invite everyone else to welcome them. This works well; it is often difficult to get people to stop talking so that the show can begin. Emotional reflection questions such as "Over the next 5 minutes, talk with your new friend and take turns describing how you think the main character felt at the end of the play and why."

Post-performance parties

Marcus Kyd of Taffety Punk Theatre Company is quoted as saying:

> Many would love to be able to [get a drink after the show and talk about what we saw] after watching a piece of theatre, but so often we're kicked out of the lobby the moment the show ends. So we go home, missing an opportunity to make meaning out of this experience (Langsdorf).

To this end, City Lights Theatre Company in San Jose, California USA has had great success providing free post-performance parties with light food and drink after every performance. Many audience members stay to chat with each other and meet the out-of-costume actors to discuss the play and characters. Audience members have become so accustomed to the

post-performance party that they have commented that they were surprised when other theatre companies don't have them.

Talkbacks (in-venue and virtual) focused on exploring emotions

Talkbacks are a mainstay strategy for audience engagement, and usually happen in the venue after a specific performance. While the desire to attend a talkback may influence an audience member's decision to attend on a specific day, audience members who attend on non-talkback days miss out. In 2019, I conducted three experiments testing digital talkbacks that encouraged audience members to text in their questions to an actor, join a video chat to talk with each other, and call in to an audio-only talkback (McBride). This allowed audience members from any performance to participate, from the comfort of their own home, and participation was high. Similar activities with a focus on reflecting on the emotional experiences of characters, actors, and audience would be easy to implement.

Emotional word clouds and interactive technologies

In 2012, my colleague Alan Brown and I led an experiment at the Center Theatre Group in Los Angeles, California, USA to allow audience members to form an interactive word cloud based on answers to questions on emotions. Audience members responded to the prompt by texting in a one-word response from their mobile devices and could then see their word form on a projected screen with others at the interval. In observing audiences participating in this activity, small conversations naturally broke out between audience members as they texted in different responses to questions such as "What do you think the main character was feeling at the end of

the first act?" Since that time, several low-cost commercial solutions to do this have become available, including polleverywhere.com and mentimeter.com, which both interact with a projector and screen to allow for the visualization.

Written guides pre- and post-performance

As I have described in Chapter 3, the theory of the arc of engagement describes strong audience interest in anticipatory content before the performance and meaning-making content after the performance. Theatre companies sometimes provide dramaturgical guides to audience members to help them to prepare to attend and to make sense of what they have experienced (Wallace). These guides provide a valuable distribution method for prompts reflecting on both anticipatory and reflective emotional experiences.

Prompt cards provided at exit of the venue

A trend in recent years employed by some theatre companies is to provide audience members with a small gift that is relevant to the performance (Gardner). Examples include lapel pins with production slogans, small cards with conversational prompts, and food recipes mentioned in the performance. Conversational prompts inviting audience members to reflect on emotions experienced during the performance could be printed and provided to audience members as they exit the venue.

Identity-based objects

Museums frequently ask their members to contribute meaningful emotional objects to an exhibit. With a twist on this engagement idea, adapted to theatre, audience members would be asked to bring an item that was emotionally meaningful to them to a performance, and have an opportunity to share that meaning with others. For example, in a play focusing on World War II, audience members might bring in letters from family members who were stationed overseas and share their memories or stories that the person once related to them.

Onstage games and staged readings

Rather than remaining spectators, audience members may themselves perform on the stage and test out the emotional experiences of characters. A roadmap for these experiences is provided by Augusto Boal in his "forum theatre" style, which tasks audiences with creating skits to solve a difficult social or political issue. Extensions of this form might include asking audience members to imagine scenes between characters that led to the story of the play, alternate versions of the story of the play, or scenes that might have happened after the play, as consequences of the actions of the play.

Physiological measurement

Theatre companies wishing to experiment with measuring physiological response to emotional experiences have many options at a range of costs and sophistication, and I provide several options in Appendix 2. It is important to note that simply measuring physiological response does not create emotional response. A stimulus is still needed, though the stimulus

might take many forms (watching a performance, responding to a written prompt, acting out a scene, etc.) However, the participant's knowledge that they are being monitored might affect their emotional response, and more research is needed.

Incorporate emotional prompts into all communications language

Theatre companies send millions of communications to their audiences each season, and in my professional experience, emotional experience design is rarely utilized. This hugely underutilized potential should be the starting point for every theatre company wishing to augment emotional experiences. From a marketing perspective, we often tell audiences that shows are now on sale, and perhaps provide a synopsis. But we rarely communicate *why* an audience member should see a specific production (as an answer to their question "What's in it for me?"). The emotional goal should be a spotlight in such communications. The marketing trope "It's the feel-good event of the season" can be easily augmented to "Can you imagine how great you're going to feel after seeing this show?" Asking audience members to reflect on how they are going to feel after purchasing a product is a mainstay of traditional advertising. Donation requests similarly might add testimonials from other donors sharing that "I feel great when I donate to help create these meaningful theatre experiences" and asking potential donors to think about how they may feel after donating.

Appendix 4: Post-performance questionnaire script

Research Study: Emotions and Live Theatre

Participant name _____ Mobile # _____

Now that you have seen I *and You* by Lauren Gunderson at Hampstead Theatre, we have a few brief questions about your experience.

1. What emotions are you feeling right now?
2. What strong emotions (if any) do you remember feeling during the play? What was happening during the story at that time? Please list any plot points you remember having a strong emotional reaction to.
3. Did wearing the band interfere with your theatre experience? Please circle and answer:

No (Forgot you were wearing it) Yes, Slightly Yes, Moderately Yes, Severely

If yes, in what way?

Please let us know three possible windows for days/times that would be for you, so the researcher can call you with the follow-up phone interview. At the completion of the phone interview, you will be sent a code for a £25 gift certificate on Amazon.

Thank you for your participation in this part of the study.

Appendix 5: Follow-up Interview Script

1. GREET PARTICIPANT
2. Can you tell me about what emotions you remember feeling during the play, now that some time has passed?
3. You said on your post-performance questionnaire that you were feeling "_____" at the end of the play. Can you tell me more about that?
4. (If not already described) Can you tell me what you remember feeling at the end of the play?
5. It's fine if you choose not to answer this next question. This play deals with complex issues around someone with a life-threatening illness. Have you ever experienced a life-threatening illness yourself, or have you had a close family member or friend experience a life-threatening illness?
6. Did wearing the wristband affect your experience of watching the play?
7. THANK PARTICIPANT AND PROVIDE AMAZON GIFT CODE

Considerations for Physiological Measurement in Theatre

As you design your research, consider each of the following questions. If the answer to any of the questions is "yes", consider potential remedies to either eliminate the issue or reduce the severity of the issue as much as possible.

Does the proposed research…	IF YES, HOW? (Example: Yes. By default, the biometric wristband has a blinking yellow light that can't be disabled.)	POTENTIAL REMEDY (Example: Once recording has started, cover the yellow light with black tape so it won't be seen by actors and audience members.)
distract cognitively and/or physically?		
influence physiologically and/or emotionally?		
change the perception and/or quality of the performance?		
restrict portability and/or length of performance?		
disrespect cultures, rituals, group dynamics, and/or individual expectations?		
fail to follow standard research protocols?		
fail to plan to protect user data?		

WORKS CITED

"19Th-Century Theatre - Victoria And Albert Museum." *Vam.ac.uk*. N.p., 2017. Web. 8 Mar. 2017.

"308 Early Greek Comedy And Satyr Plays, Classical Drama And Theatre." *Usu.edu*. N.p., 2016. Web. 21 Sept. 2016.

"2014 Patron Loyalty Study: Loyalty By The Numbers." N.p., 2016. Web. 19 Dec. 2016.

"ABC-CLIO." *Freecontent.abc-clio.com*. N.p., 2017. Web. 1 Jan. 2017.

"Advanced EEG Technology - Backed By Science." *Emotiv*. N.p., 2016. Web. 26 Sept. 2016.

Akhtar, Ayad. "An Antidote To Digital Dehumanization? Live Theater (Published 2017)." *Nytimes.com*. N.p., 2017. Web. 30 May 2022.

Alshak, Mark, and Joe Das. "Neuroanatomy, Sympathetic Nervous System." *Ncbi.nlm.nih.gov*. N.p., 2022. Web. 28 May 2022.

Andres, Hayward P. "A Comparison Of Face-To-Face And Virtual Software Development Teams." *Team Performance Management: An International Journal* 8.1/2 (2002): 39-48. Web.

Artaud, Antonin. *The Theatre And Its Double*. Richmond, Surrey: Oneworld Classics, 2009. Print.

Audience Outlook Monitor. *http://audienceoutlookmonitor.com/about*. N.p., 2021. Web. 12 Nov. 2021.

Ayata, Deger, Yusuf Yaslan, and Mustafa Kamasak. "Emotion Recognition Via Galvanic Skin Response: Comparison Of Machine Learning Algorithms And Feature Extraction Methods." *Dergipark.gov.tr*. N.p., 2017. Web. 13 Dec. 2017.

Azarbarzin, Ali et al. "Relationship Between Arousal Intensity And Heart Rate Response To Arousal." *Sleep* 37.4 (2014): 645-653. Web.

Baclawski, K. "The Observer Effect." 2018 IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA) (2018): N.p., Web. 4 July 2022.

Balters, Stephanie, and Martin Steinert. "Capturing Emotion Reactivity Through Physiology Measurement As A Foundation For Affective Engineering In Engineering Design Science And Engineering Practices." *Journal of Intelligent Manufacturing* 28.7 (2015): 1585. Web.

Barker, Martin. *'Live At A Cinema Near You': How Audiences Respond To Digital Streaming In The Arts"*. Bristol: Intellect, The Audience Experience, edited by Radbourne, Glow & Johanson, 2014. Print.

Barry, Ellen. "Designated Cheering Spectators Thrive At The Bolshoi Theater." *Nytimes.com*. N.p., 2017. Web. 9 May 2017.

"BBC Bitesize - Epic Theatre And Brecht." *Bbc.co.uk*. Web. 12 Mar. 2017.

Bellos, David. *The Novel Of The Century*. Farrar, Straus and Giroux, 2017. Print.

Benanti, Carol Ann. "Spotlight Theatre Streams Songs, Stories, Laughter Saturdays On Facebook." *SILive* 2020. Web. 27 Apr. 2022.

Blair, Kelsey. "Broomsticks And Barricades: Performance, Empowerment, And Feeling In Wicked And Les Misérables." *Studies in Musical Theatre* 10.1 (2016): 55-67. Web.

Blank, Jessica, and Erik Jensen. "The Uses Of Empathy: Theater And The Real World." *Theatre History Studies* 25 (2005): n. pag. Web. 1 Jan. 2017.

Bloom, Gina. *Gaming The Stage*. Ann Arbor: University of Michigan Press, 2018. Print.

Blume-Kohout, Margaret E., Sara R. Leonard, and Jennifer L. Novak-Leonard. "When Going Gets Tough: Barriers And Motivations Affecting Arts Attendance." *nea.gov*. N.p., 2017. Web. 11 Apr. 2017.

Boal, Augusto. *Theatre Of The Oppressed*. New York: Theatre Communications Group, 1985. Print.

Boerner, Sabine, and Johanna Jobst. "Enjoying Theater: The Role Of Visitor Response To The Performance." *Psychology of Aesthetics, Creativity, and the Arts* 7.4 (2013): 391-408. Web.

Booth, Michael R. *Theatre In The Victorian Age*. Cambridge: Cambridge University Press, 1999. Print.

Bordwell, David. *Reinventing Hollywood: How 1940S Filmmakers Changed Movie Storytelling*. Chicago: University of Chicago Press, 2017. Print.

Boucsein, Wolfram. *Electrodermal Activity. Techniques In Psychophysiology*. 3rd ed. New York: Springer, 2012. Print.

Bradley, Margaret M., and Peter J. Lang. "Measuring Emotion: The Self-Assessment Manikin And The Semantic Differential." *Journal of Behavior Therapy and Experimental Psychiatry* 25.1 (1994): 49-59. Web.

Braithwaite, Jason et al. *Birmingham.ac.uk*. N.p., 2015. Web. 30 May 2022.

Brantley, Ben, Jesse Green, and Maya Phillips. ""Hybrid New World: The Stage As Screen: [Arts And Leisure Desk]."." *New York Times* 2020. Web. 10 Dec. 2021.

Brooke, James. "Gay Man Beaten And Left For Dead; 2 Are Charged." *Nytimes.com*. N.p., 2017. Web. 1 Jan. 2017.

Brown, Alan, and Jennifer Novak. *Culturehive.co.uk*. N.p., 2007. Web. 30 Nov. 2021.

Brown, Alan, and Rebecca Ratzkin. "8." *Making Sense of Audience Engagement*. N.p., 2017. Web. 13 June 2017.

Brown, Alan, and Rebecca Ratzkin. *Intrinsicimpact.org*. N.p., 2017. Web. 13 Dec. 2017.

Brown, Alan, and Rebecca Ratzkin. "Understanding The Intrinsic Impact Of Live Theatre." *Intrinsicimpact.org*. N.p., 2012. Web. 13 Dec. 2021.

Brown, Alan. "Findings For NYC Off-Broadway Cohort." Audience Outlook Monitor https://www.audienceoutlookmonitor.com/theatre-development-fund. N.p., 2021. Web. 15 Nov. 2021.

Brown, Alan. "The Changing Cultural Diet" *Audience Outlook Monitor*. N.p., 2022. Web. 28 Apr. 2022.

Brown, Scott. "Theater Review: The Freakily Immersive Experience Of Sleep No More - Theater - Vulture." *Vulture*. N.p., 2011. Web. 20 May 2022.

Burns, Mark J. "Dogs And Disney: Sports ‘Theme Nights’ Are A Crucial Tool In Bringing Crowds Back After COVID." *Morning Consult*. N.p., 2022. Web. 28 Apr. 2022.

Cacioppo, John et al. "The Psychophysiology Of Emotion." *Handbook Of Emotions*. JM Haviland-Jones and M Lewis. The Guilford Press, 2000. Web. 30 May 2022.

Calder, Andrew J. *The Oxford Handbook Of Face Perception*. Oxford: Oxford University Press, 2011. Print.

Calistra, Cole. "Kairos: Fixing Uneven Lighting For Face Detection." *Kairos*. N.p., 2022. Web. 28 Apr. 2022.

Capocasa, Marco et al. *Between Universal And Local: Towards An Evolutionary Anthropology Of Emotions*. 2nd ed. Slovene Anthropological Society, 2016. Print.

Chan, MeiKi, Wing Tung Au, and Carole Hoyan. "Exploring Theater Experiences Among Hong Kong Audiences." *Cogent Arts & Humanities* 6.1 (2019): 1588689. Web.

Cheney, Sheldon. *The Art Theatre*. New York: Alfred A. Knopf, 1925. Print.

"City Lights: A Christmas Carol." *Cltc.org*. N.p., 2022. Web. 2 Feb. 2022.

Clarkson-Heaps, Corinne. "'Saudade': A Brazilian Word For Longing." *UPR Utah Public Radio*. N.p., 2021. Web. 29 May 2022.

Claudio, Martella et al. "How Was It?: Exploiting Smartphone Sensing To Measure Implicit Audience Responses To Live Performances." Proceedings of the 23rd ACM International Conference on Multimedia, 2015. pp. 201–10. Print.

Coan, James A, and John J. B Allen. *Handbook Of Emotion Elicitation And Assessment*. Oxford: Oxford University Press, 2007. Print.

Cohen, Patricia. "A New Survey Finds A Drop In Arts Attendance (Published 2013)." *Nytimes.com*. N.p., 2013. Web. 3 June 2022.

Collet, Christian et al. "Autonomic Nervous System Response Patterns Specificity To Basic Emotions." *Journal of the Autonomic Nervous System* 62.1-2 (1997): 53. Web.

Collins, Randall. *Interaction Ritual Chains*. Princeton: Princeton University Press, 2004. Print.

Collins-Hughes, Laura. "When Theater Is A Religious Experience (Published 2019)." *Nytimes.com*. N.p., 2019. Web. 9 Sept. 2021.

"Concord Theatricals." Response to Coronavirus (COVID-19) https://www.concordtheatricals.com/resources/response-to-coronavirus. N.p., 2021. Web. 6 Dec. 2021.

Coughlan, Sean. "Half Of Teenagers 'Never Been In A Theatre' - BBC News." *BBC News*. N.p., 2017. Web. 11 Apr. 2017.

Courtney, Richard. *Drama And Feeling*. Montreal: McGill-Queen's University Press, 1995. Print.

Cremona, Vicki Ann. *Theatrical Events*. 1st ed. Amsterdam: Rodopi, 2004. Print.

Crews, Courtney. "The Nonprofit Theatre Sector Contributed Over $2.8 Billion To The U.S. Economy In 2019." *DataArts*. N.p., 2020. Web. 27 Nov. 2021.

Csikszentmihalyi, Mihaly, and Rick E Robinson. *The Art Of Seeing: An Interpretation Of The Aesthetic Encounter*. London: J. Paul Getty Museum, 1990. Print.

Darby, Robert. "Research Ethics And Data Protection." *Reading.ac.uk*. N.p., 2022. Web. 30 May 2022.

Darwin, Charles, and Francis Darwin. *The Expression Of The Emotions In Man And Animals*. New York: New York University Press, 1989. Print.

Davies, Jessica. "How BBC Uses Facial Recognition To Measure Native Advertising." *Digiday*. N.p., 2016. Web. 26 Sept. 2016.

de Groot, Jasper H. B. et al. "Chemosignals Communicate Human Emotions." *Psychological Science* 23.11 (2012): 1417-1424. Web.

"Digital Audience Survey | Findings." The Audience Agency https://www.theaudienceagency.org/evidence/digital-audience-survey-findings. N.p., 2021. Web. 15 Nov. 2021.

DivaBehavior. Patti Lupone Stops 'Gypsy' Mid-Show To Yell At A Photographer. 2016. Web. 17 May 2016.

Doberenz, Sigrun et al. "Methodological Considerations In Ambulatory Skin Conductance Monitoring." *International Journal of Psychophysiology* 80.2 (2011): 87-95. Web.

Doeser, James. "Towards “Normalization” Of Covid-19 As An Acceptable Risk." *Audience Outlook Monitor*. N.p., 2021. Web. 24 Nov. 2021.

Duenwald, Mary. "The Physiology Of . . . Facial Expressions | Discovermagazine.Com." Discover Magazine. N.p., 2005. Web. 23 Sept. 2016.

Durkheim, E. *The Elementary Forms Of Religious Life*. New York, NY: Free Press (original work published 1912, 1964. Print.

"E4 EDA/GSR Sensor." *Empatica*. N.p., 2017. Web. 28 Dec. 2017.

Eaton, Kit. "These Apps Are Made For Walking." *Nytimes.com*. N.p., 2015. Web. 26 Sept. 2016.

Eckert, Stephen. "What Is Immersive Theater?." *Contemporary Performance*. N.p., 2021. Web. 2 Feb. 2022.

Ekman, Paul, and Erika L Rosenberg. *What The Face Reveals*. New York: Oxford University Press, 1997. Print.

Ekman, Paul, and Wallace Friesen. "Facial Action Coding System: A Technique For The Measurement Of Facial Movement." *Consulting Psychologists Press, Palo Alto* (1978): n. pag. Print.

Ekman, Paul, and Wallace V. Friesen. "Constants Across Cultures In The Face And Emotion.." *Journal of Personality and Social Psychology* 17.2 (1971): 124-129. Web.

Ekman, Paul. "Expression And The Nature Of Emotion." *Approaches To Emotion*. K.S. Scherer and Paul Ekman. Hillsdale, NJ: Erlbaum, 1984. Print.

Ekman, Paul. "Facial Expressions." *Handbook of Cognition and Emotion* (1999): 301-320. Web. 21 Sept. 2016.

Ekman, Paul. "Universal Facial Expressions Of Emotion." N.p., 1970. Web. 30 Dec. 2017.

Ekman, Paul. "Universals And Cultural Differences In Facial Expressions Of Emotion." N.p., 1972. Web. 6 May 2022.

Elfenbein, Hillary Anger, Abigail A. Marsh, and Nalini Ambady. "Emotional Intelligence And The Recognition Of Emotion From Facial Expressions." N.p., 2016. Web. 26 Sept. 2016.

Ellis, Katherine. "Who Cares If You Listen? Researching Audiences Behaviors In Nineteenth-Century Paris." *The Oxford Handbook Of Music Listening In The 19Th And 20Th Centuries*. Christian Thorau and Hansjakob Ziemer. Oxford University Press, 2018. Print.

"Emotion Recognition Software And Analysis - Affectiva." *Affectiva*. N.p., 2016. Web. 26 Sept. 2016.

"Emotion, Theories Of | Internet Encyclopedia Of Philosophy." *Iep.utm.edu*. N.p., 2016. Web. 23 Sept. 2016.

"EMOTIV Insight Brainwear." *Emotiv*. N.p., 2017. Web. 28 Dec. 2017.

"Empatica E4 Sensors." *Box.empatica.com*. N.p., 2022. Web. 21 Jan. 2022.

"Epic Theatre Using Verfremdungseffekt." *Web.mit.edu*. N.p., 2022. Web. 27 Apr. 2022.

Evans, Ron. "The Talk Of The Town." *ArtsProfessional*. N.p., 2019. Web. 2 June 2022.

Evans, Ron. "Zoom: Shows Promise But Could Do Better." *Arts Professional* 2020. Web. 3 Dec. 2021.

Eversmann, Peter. "The Experience Of The Theatrical Event." *Theatrical Events: Borders Dynamics Frames*. Vicky Ann Cremona et al. Amsterdam: Rodopi, 2004. 139-174. Print.

Everts, Sarah. "The Hairy Origins Of Our Sweat Glands." *Science Friday*. N.p., 2021. Web. 28 Apr. 2022.

"Facial Action Coding System." *Paul Ekman Group, LLC*. N.p., 2016. Web. 23 Sept. 2016.

Faigman, David, Stephen Fienberg, and Paul Stern. "The Limits Of The Polygraph." *Issues in Science and Technology*. N.p., 2003. Web. 5 May 2022.

Fantino, E. Emotion: The Study Of Behavior: Learning, Motivation, Emotion And Instinct. Glenview, Illinois: Scott Foresman, 1973. Print.

"February 2021 New Jersey Cohort Results." *Audience Outlook Monitor*. N.p., 2021. Web. 9 Dec. 2021.

"Feel." *Myfeel.co*. N.p., 2017. Web. 11 Dec. 2017.

Fehr, Beverley, and James A. Russell. "Concept Of Emotion Viewed From A Prototype Perspective." *Journal of Experimental Psychology: General* 113.3 (1984): 464-486. Web.

Felner, Mira, and Claudia Orenstein. *The World Of Theatre: Tradition And Innovation*. 1st ed. Pearson, 2005. Print.

Fong, Joss. "Eye-Opener: Why Do Pupils Dilate In Response To Emotional States?." *Scientific American*. N.p., 2016. Web. 16 Aug. 2016.

Gans, Andrew. "Broadway Producer Landesman Confirmed As Chairman Of NEA." *Playbill*. N.p., 2009. Web. 31 Jan. 2022.

Garbarino, Ellen, and Mark S. Johnson. "Effects Of Consumer Goals On Attribute Weighting, Overall Satisfaction, And Product Usage." *Psychology and Marketing* 18.9 (2001): 929-949. Web.

Garbarino, Ellen, and Mark S. Johnson. "The Different Roles Of Satisfaction, Trust, And Commitment In Customer Relationships." *Journal of Marketing* 63.2 (1999): 929-949. Web.

Gardner, Lyn. "The History Boys Tempts Audiences With A Free Gift." *The Guardian*. N.p., 2007. Web. 10 May 2022.

Geelhoed, Erik et al. "Co-Present And Remote Audience Experiences: Intensity And Cohesion." *Multimedia Tools and Applications* 76.4 (2016): 5573-5606. Web.

Gilbert, Allan H. "The Aristotelian Catharsis." *The Philosophical Review* 35.4 (1926): 301. Web. 27 Jan. 2022.

Gilbride, Shelly, and David Orzechowicz. "How We Feel About Art: Motivation, Satisfaction, And Emotional Experiences In Performing Arts Audiences." *wolfbrown.com*. N.p., 2008. Web. 18 July 2015.

"Glad, Mad, Sad? Teams Catch A Leader's Mood." *Daniel Goleman*. N.p., 2016. Web. 14 Mar. 2016.

Global Industry Analysts. "Global Licensed Sports Merchandise Industry." *Reportlinker.com*. N.p., 2022. Web. 28 Apr. 2022.

Goleman, Daniel. *Emotional Intelligence*. New York: Bantam Books, 1995. Print.

Goleman, Daniel. *Working With Emotional Intelligence*. New York: Bantam Books, 2006. Print.

Graham-White, Anthony. ""Ritual" In Contemporary Theatre And Criticism." *Educational Theatre Journal* 28.3 (1976): 318. Web.

Grant, Kelli. "'Hamilton' Tony Nods May Make Getting Tix Even Harder, So Try These Tips." *CNBC*. N.p., 2016. Web. 11 Apr. 2017.

Greene, Jay et al. "Learning From Live Theater: Students Realize Gains From Theater Trips - Research." *Education Next*. N.p., 2015. Web. 2 Jan. 2017.

Grein, Paul. "The Fine Art Of 'Papering The House' : Free Tickets Sometimes Offered When Performer Can't Fill The Venue." *Los Angeles Times*. N.p., 1989. Web. 23 May 2022.

Gross, James J., and Robert W. Levenson. "Emotion Elicitation Using Films." *Cognition & Emotion* 9.1 (1995): 87-108. Web.

Guibert, Greg, and Iain Hyde. "Https://Www.Arts.Gov/Sites/Default/Files/COVID-Outlook-Week-Of-1.4.2021-Revised.Pdf." *Arts.gov*. N.p., 2021. Web. 12 Nov. 2021.

Gupta, Nisha. "Singing Away The Social Distancing Blues: Art Therapy In A Time Of Coronavirus." *Journal of Humanistic Psychology* 60.5 (2020): 593-603. Web.

Guthrie, Gerard. *Basic Research Methods: An Entry Into Social Science Research*. Los Angeles: SAGE Publications, 2012. Print.

Hatfield, Elaine, John T. Cacioppo, and Richard L. Rapson. "Emotional Contagion." *Current Directions in Psychological Science* 2.3 (1993): 96-99. Print.

Heide, Frederick J., Natalie Porter, and Paul K. Saito. "Do You Hear The People Sing? Musical Theatre And Attitude Change.." *Psychology of Aesthetics, Creativity, and the Arts* 6.3 (2012): 224-230. Web.

Heim, Caroline. *Audience As Performer: The Changing Role Of Theatre Audiences In The Twenty-First Century*. Routledge, 2015, 2015. Print.

Herborn, Katherine A. et al. "Skin Temperature Reveals The Intensity Of Acute Stress." *Physiology & Behavior* 152 (2015): 225-230. Web.

Hochschild, Arlie Russell. *The Managed Heart*. Berkeley: University of California Press, 2012. Print.

"Home : Oxford English Dictionary." *Oed.com*. N.p., 2021. Web. 28 Jan. 2021.

Horton, Adrian. "Broadway Shuts Down Due To Coronavirus Pandemic." *the Guardian | https://www.theguardian.com/stage/2020/mar/12/broadway-shuts-down-coronavirus*. N.p., 2021. Web. 12 Nov. 2021.

"How To Fly A Model Helicopter With Your Brain And Other Adventures In EEG Gaming | KQED Science." *Ww2.kqed.org*. N.p., 2016. Web. 29 Aug. 2016.

Hufendiek, Rebekka. *Embodied Emotions*. Taylor and Francis, 2015. Print.

Hugdahl, Kenneth. *Psychophysiology The Mind-Body Perspective*. Cambridge, MA: Harvard University Press, 1995. Print.

Hume, Margee et al. "Understanding Service Experience In Non-Profit Performing Arts: Implications For Operations And Service Management." *Journal of Operations Management* 24.4 (2005): 135-148. Web.

Hume, Margee, Gillian Sullivan Mort, and Hume Winzar. "Exploring Repurchase Intention In A Performing Arts Context: Who Comes? And Why Do They Come Back?." *International Journal of Nonprofit and Voluntary Sector Marketing* 12.2 (2007): 135-148. Web.

Hurley, Erin. *Theatre & Feeling*, Palgrave Macmillan, Houndmills, Basingstoke, Hampshire,, England, 2010, p. 22-28.

Iacobuţe, Ramona-Petronela. "The Theater And The Pandemic: The Theater In A Zoom Or Facebook Window." *Theatrical Colloquia* 10.2 (2020): 133-137. Web.

Jacobs, Adam. "The Pathologies Of Big Data." *Communications of the ACM* 52.8 (2009): 36-44. Web. 30 June 2022.

Jacobson, Kelsey, and Kelsey Blair. "Theatre Audience Etiquette And Norms Have Always Shifted With The Times." *The Conversation*. N.p., 2021. Web. 2 Feb. 2022.

Jain, Ajay. "The Surprising Early History Of The Subscription Model." *Linkedin.com*. N.p., 2020. Web. 21 May 2022.

James, William. "What Is An Emotion?." *Mind* os-IX.34 (1884): 188-205. Web.

Jamieson, Amber. "Performers And Staffers At “Sleep No More” Say Audience Members Have Sexually Assaulted Them." *BuzzFeed News*. N.p., 2018. Web. 20 May 2022.

Jane, Emma. "London Scratch Nights: A User'S Guide." *yellowdrama*. N.p., 2012. Web. 1 June 2022.

Johnson, James H. *Listening In Paris*. Berkeley: Univ. of California Press, 2008. Print.

Jones, Charlotte, and Richard Pulford. "Capturing The Audience Experience: A Handbook For The Theatre." *Itc-arts-s3.studiocoucou.com*. N.p., 2010. Web. 27 Nov. 2021.

Juslin, Patrik N., and Marcel R. Zentner. "Current Trends In The Study Of Music And Emotion: Overture." *Musicae Scientiae* 5.1_suppl (2001): 3-21. Web.

Karapetian, Farrah. "THE BODY POLITIC: FROM MEYERHOLD TO MY BARBARIAN." *Yoshuaokon.com*. N.p., 2019. Web. 31 Jan. 2022.

KAREN L. SCHMIDT, JEFFREY F. COHN. "Human Facial Expressions As Adaptations:Evolutionary Questions In Facial Expression Research." *American journal of physical anthropology* Suppl 33 (2001): 3. Web. 21 Sept. 2016.

Kaye, Kate. "Intel Thinks Its AI Knows What Students Think And Feel In Class." *Protocol*. N.p., 2022. Web. 28 Apr. 2022.

Keaveney, Madeline M. "Death Be Not Proud: An Analysis Of Margaret Edson's Wit." *Women and Language* 27.1 (2017): n. pag. Web. 1 Jan. 2017.

Keesey, Donald. "On Some Recent Interpretations Of Catharsis." *The Classical World* 72.4 (1978): 193. Web. 24 Jan. 2022.

Kensinger, E.A. "Remembering Emotional Experiences: The Contribution Of Valence And Arousal." *Reviews in the Neurosciences* 15.4 (2004): n. pag. Web.

Kerley, DeAnna. "Why Do We Blow Out Candles On Birthday Cakes?." *Mental Floss*. N.p., 2014. Web. 22 May 2022.

Khezri, Mahdi, Mohammad Firoozabadi, and Ahmad Reza Sharafat. "Reliable Emotion Recognition System Based On Dynamic Adaptive Fusion Of Forehead Biopotentials And Physiological Signals." *Computer Methods and Programs in Biomedicine* 122.2 (2015): 149-164. Web.

Klein, Jeanne, and Shifra Schonmann. "Theorizing Aesthetic Transactions From Children's Criterial Values In Theatre For Young Audiences." *Youth Theatre Journal* 23.1 (2009): 60-74. Web.

Kleinginna, Paul R., and Anne M. Kleinginna. "A Categorized List Of Emotion Definitions, With Suggestions For A Consensual Definition." *Motivation and Emotion* 5.4 (1981): 345-379. Web.

Know Thyself: Tracking Every Facet of Life, 24/7/365 | WIRED, and 24/7/365 Know Thyself: Tracking Every Facet of Life. "Know Thyself: Tracking Every Facet Of Life, From Sleep To Mood To Pain, 24/7/365." *WIRED*. N.p., 2016. Web. 17 May 2016.

Koestler, Arthur. *The Art Of Creation*. 1st ed. 1975. Print.

Konijn, Elly A. "Spotlight On Spectators: Emotions In The Theater." *Discourse Processes* 28.2 (1999): 169-194. Web.

Konijn, Elly. *Acting Emotions*. Amsterdam: Amsterdam University Press, 2000. Print.

Kreibig, Sylvia D. "Autonomic Nervous System Activity In Emotion: A Review." *Biological Psychology* 84.3 (2010): 394-421. Web.

Laban, Jude. "Culture Sector'S Contribution To UK Economy Leaps By £7Bn | News | The Stage." *The Stage*. N.p., 2017. Web. 13 Dec. 2017.

Lacombe, Hervé. *The Keys To French Opera In The Nineteenth Century*. 1st ed. Berkeley: University of California Press, 2001. Print.

Langsdorf, Kate. "Meeting And Mingling: An Experiment In Audience Engagement." *Fords Theatre*. N.p., 2022. Web. 10 May 2022.

Latulipe, Celine, Erin A. Carroll, and Danielle Lottridge. "Proceedings Of The SIGCHI Conference On Human Factors In Computing Systems." *Conference On Human Factors In Computing Systems*. New York, NY, USA: ACM, 2011. 1845-1854. Print.

Latulipe, Celine, Erin Carroll, and Danielle Lottridge. "Love, Hate, Arousal And Engagement: Exploring Audience Responses To Performing Arts." *Proceedings of the 2011 Annual Conference on Human Factors in Computing Systems - CHI '11,* January, 2011, (2011): p. 1845. Print.

Lauren Said-Moorhouse, for CNN. "Fitbit Captures Exact Moment Man's Heart Breaks." *CNN*. N.p., 2016. Web. 29 Aug. 2016.

Laurents, Arthur, Jule Styne, and Stephen Sondheim. "Gypsy | Concord Theatricals." *Concord Theatricals*. N.p., 2022. Web. 27 June 2022.

Lazarus, Richard S. *Emotion And Adaptation*. New York, NY: Oxford University Press, 1994. Print.

"League Of Chicago Theatres September 2021 Results." *Audience Outlook Monitor*. N.p., 2021. Web. 24 Nov. 2021.

LeBon, Gustave. *CROWD. A STUDY OF THE POPULAR MIND*. [S.l.]: HANSEBOOKS, 2021. Print.

Lee, Alexander. "The Sound Of Silence | History Today." N.p., 2017. Web. 2 Feb. 2022.

Lee, Dokyun, Kartik Hosanagar, and Harikesh S. Nair. "Advertising Content And Consumer Engagement On Social Media: Evidence From Facebook." N.p., 2018. Web. 5 July 2022.

Lee, Edward D. "Using The Stanislavski Method To Teach Non-Realistic Acting." N.p., 1997. Web. 12 Mar. 2017.

Levenson, Robert. "Emotion And The Autonomic Nervous System: A Prospectus For Research On Autonomic Specificity." *Bpl.berkeley.edu*. N.p., 1988. Web. 12 Jan. 2022.

Levy, Jonathan. "Reflections On How The Theatre Teaches." *The Journal of Aesthetic Education* 39.4 (2005): 20-30. Web.

Liedke, Heidi. "Emancipating The Spectator? Livecasting, Liveness, And The Feeling I." *Performancematters-thejournal.com*. N.p., 2019. Web. 4 Dec. 2021.

Linder, Jason. "Mindfulness Secrets For Emotional Balance In Hard Times." *Psychology Today*. N.p., 2020. Web. 20 May 2022.

"LOCT July 2021." *Audience Outlook Monitor, July 2021 results*. N.p., 2021. Web. 6 Dec. 2021.

Loewenstern, Mark. "How Live Theater Is Innovating Its Way Through The Pandemic." *Barrons.com*. N.p., 2020. Web. 6 Dec. 2021.

Logan, Brian. "Pay-Per-Laugh: The Comedy Club That Charges Punters Having Fun." *the Guardian*. N.p., 2014. Web. 26 Sept. 2016.

Luo, Mufan et al. "Emotional Amplification During Live-Streaming: Evidence From Comments During And After News Events." *Proceedings of the ACM on Human-Computer Interaction* 4.CSCW1 (2020): 1-19. Web.

Ma, Ralph, and Amr Mohamed. "Image Processing Pipeline For Facial Expression Recognition Under Variable Lighting." *Stanford.edu*. N.p., 2015. Web. 26 Sept. 2016.

MacArthur, Michelle. "Hope Springs Eternal In The Stream You Step In." *Intermission* 2020. Web. 3 Dec. 2021.

MacArthur, Michelle. "The Pedagogy Of Grief: Lessons From Making Zoom Theatre During A Pandemic." *Canadian Theatre Review* 188 (2021): 49-53. Web.

MacDonald, Laura. "Seasons Of Love." *Performance Research* 25.1 (2020): 112-120. Web.

Main, Jamila. "Why We Need Online Theatre After Lockdown." ArtsHub Australia https://www.artshub.com.au/news/opinions-analysis/schrodingers-precipice-online-theatre-after-lockdown-2508752/. N.p., 2021. Web. 16 Nov. 2021.

Maio, Gregory R., and Victoria M. Esses. "The Need For Affect: Individual Differences In The Motivation To Approach Or Avoid Emotions." *Journal of Personality* 69.4 (2001): 583-614. Web.

"March 2021 NYC Cohort Results." *Audience Outlook Monitor*. N.p., 2021. Web. 9 Dec. 2021.

Matsumoto, David. "Cultural Influences On Facial Expressions Of Emotion." *Southern Communication Journal* 56.2 (1991): 132. Web.

Matsumoto, David. "More Evidence For The Universality Of A Contempt Expression." *Motivation and Emotion* 16.4 (1992): 363-368. Web. 21 Sept. 2016.

Mauss, Iris B., and Michael D. Robinson. "Measures Of Emotion: A Review." *Cognition & Emotion* 23.2 (2009): 5. Web.

McBride, Dara. "Choose Your Own Talkback At City Lights Theater Company." *AMERICAN THEATRE*. N.p., 2019. Web. 10 May 2022.

McCarthy, C., N. Pradhan, and A. Adler. "Validation Of The Empatica E4 Wristband." *2016 IEEE EMBS International Student Conference (ISC)* (2016): 1-4. Web. 3 Jan. 2018.

McCarthy, Kevin F et al. *Gifts Of The Muse*. Santa Monica: RAND, 2005. Print.

McCaughey, Claire. "Comparisons of Arts Funding in Selected Countries: Preliminary Findings." *Canada Council for the Arts*, Canada Council for the Arts, 2015, https://intranet.americansforthearts.org/sites/default/files/Comparisonsofartsfunding27Oct2005_0.pdf.

McConachie, Bruce A. *Engaging Audiences*. 1st ed. New York: Palgrave Macmillan, 2008. Print.

McCorry, Laurie Kelly. "Physiology Of The Autonomic Nervous System." *American Journal of Pharmaceutical Education* 71.4 (2007): 78. Web. 29 Apr. 2022.

McCreesh, Shawn. "All Of Peter Gelb'S Big Problems Running The Metropolitan Opera Only Got Bigger During The Pandemic.." *New York Magazine* 2021. Web. 4 Dec. 2021.

McKenna, Jennifer. "Creating Community Theatre For Social Change: Studies In Theatre And Performance: Vol 34, No 1." *Tandfonline.com*. N.p., 2017. Web. 1 Jan. 2017.

McLeod, Saul. *Canadacollege.edu*. N.p., 2018. Web. 22 May 2022.

McParland, Robert P. "The Sounds Of The Audience." *Mosaic : a Journal for the Interdisciplinary Study of Literature* 42.1.117-32 (2009): n. pag. Web. 11 Dec. 2021.

Meeks, Suzanne, Sarah Kelly Shryock, and Russell J. Vandenbroucke. "Theatre Involvement And Well-Being, Age Differences, And Lessons From Long-Time Subscribers." *The Gerontologist* (2017): n. pag. Web.

"Melbourne Playback Theatre Survey." *Surveymonkey.com*. N.p., 2017. Web. 28 Dec. 2017.

Mendoza, N.F. "Zoom Zips Ahead Of Google Meet, Microsoft Teams And Skype In One Ranking." *TechRepublic* 2021. Web. 2 Dec. 2021.

Menzer, Melissa. The Arts In Early Childhood Education: Social And Emotional Benefits Of Arts Participation. 1st ed. Office of Research & Analysis, 2015. Web. 2 Jan. 2017.

"Merriam-Webster: Emotion." *Merriam-webster.com*. N.p., 2018. Web. 16 Jan. 2018.

"Metropolitan Opera On Demand." *Metopera.org*. N.p., 2021. Web. 4 Dec. 2021.

Midgette, Ann. "HD Broadcasts, Once The Future Of Opera, Are Now Seen By Some As Its Demise." *The Washington Post* 2016. Web. 4 Dec. 2021.

Miles, Tim. "No Greater Foe? Rethinking Emotion And Humour, With Particular Attention To The Relationship Between Audience Members And Stand-Up Comedians." *Comedy Studies* 5.1 (2014): 12-19. Web.

"Mindfield Biosystems Ltd.." *Mindfield Biosystems Ltd.*. N.p., 2017. Web. 28 Dec. 2017.

Monahan, Torin, and Jill A. Fisher. "Benefits Of 'Observer Effects': Lessons From The Field." *Qualitative Research* 10.3 (2010): 357-376. Web.

Monks, Kieron. "This New Tech Can Detect Your Mood - CNN.Com." *CNN*. N.p., 2016. Web. 26 Sept. 2016.

Morelle, Rebecca. "Choir Singers 'Synchronise Their Heartbeats'." *BBC News*. N.p., 2013. Web. 1 June 2022.

Morreall, John. "A New Theory Of Laughter." *Philosophical Studies* 42.2 (1982): 243-254. Web.

Morris, Jon, and James McMullen. "Measuring Multiple Emotional Responses To A Single Television Commercial." *Advances in Consumer Research* 21 (1994): 175-180. Print.

Morton, Maddy et al. ""Not For The Likes Of You" – How To Reach A Broader Audience." *CultureHive*. N.p., 2013. Web. 20 May 2022.

Mountford, Fiona. “How Artistic Director Edward Hall Saved Hampstead Theatre.” *Evening Standard*, Evening Standard, 26 Mar. 2014, https://www.standard.co.uk/culture/theatre/how-artistic-director-edward-hall-saved-hampstead-theatre-9216082.html.

Mulligan, Kevin, and Klaus R. Scherer. "Toward A Working Definition Of Emotion." *Emotion Review* 4.4 (2012): 345-357. Web. 28 Jan. 2021.

"Muse | Greek Mythology." *Encyclopedia Britannica*. N.p., 2016. Web. 21 Sept. 2016.

"National Endowment For The Arts Presents Highlights From The 2012 Survey Of Public Participation In The Arts | NEA." *Arts.gov*. N.p., 2012. Web. 12 Aug. 2015.

"National Theatre At Home." *National Theatre*. N.p., 2021. Web. 4 Dec. 2021.

Neary, Lynne. "Surveillance Cameras Draw Mixed Reaction In DC." *NPR.org*. N.p., 2008. Web. 26 Sept. 2016.

Nicholson, Jeremy. "Using Positive Reinforcement To Influence The Behavior Of Others." *Psychology Today*. N.p., 2021. Web. 18 May 2022.

"Nineteenth-Century Theatre - History Of Theatres - Exploring Theatres - Discover Theatres - The Theatres Trust." *Theatrestrust.org.uk*. N.p., 2017. Web. 8 Mar. 2017.

Noice, Helga, and Tony Noice. "An Arts Intervention For Older Adults Living In Subsidized Retirement Homes." *Aging, Neuropsychology, and Cognition* 16.1 (2008): 56-79. Web.

Noice, Tony, Helga Noice, and Arthur F. Kramer. "Participatory Arts For Older Adults: A Review Of Benefits And Challenges." *The Gerontologist* 54.5 (2013): 741-753. Web.

"Noldus." *Noldus.com*. N.p., 2016. Web. 26 Sept. 2016.

Ogarkova, Anna et al. *Components Of Emotional Meaning*. Oxford University Press. Print.

Ostrower, Francie. "Findings And Practical Implications Of A National Survey Of Cultural Participation." *The Wallace Foundation*. N.p., 2004. Web. 8 May 2017.

O'Toole, John et al. *Young Audiences, Theatre And The Cultural Conversation*. 1st ed. Dordrecht: Springer Netherlands, 2014. Print.

Perez, Frank. "El Teatro Campesino: Fifty Years And Counting | El Teatro Campesino." *Elteatrocampesino.com*. N.p., 2015. Web. 21 May 2022.

Pesner, Ben. "Audience Revolution: Case Studies Executive Summary." *tcg.org*. N.p., 2017. Web. 13 June 2017.

Piira, Olli-Pekka, Heikki V. Huikuri, and Mikko P. Tulppo. "Effects Of Emotional Excitement On Heart Rate And Blood Pressure Dynamics In Patients With Coronary Artery Disease." *Autonomic Neuroscience* 160.1-2 (2011): 107-114. Web.

Plamper, Jan, and Keith Tribe. *History Of Emotions: An Introduction*. Croydon: Oxford University Press, 2015. Print.

Plastow, Jane. "Embodiment, Intellect And Emotion: Thinking About Possible Impacts Of Theatre For Development In Three Projects In Africa." *Anthropology, Theatre, And Development: The Transformative Potential Of Performance. Anthropology, Change And Development*. A Flynn and J Tinius. Palgrave Macmillan, 2015. 107-126. Web. 4 July 2022.

Plutchik, Robert, and Henry Kellerman. *Emotion: Theory, Research And Experience, Volume 4, The Measurement Of Emotions*. San Diego: Academic Press, Inc., 1989. Print.

Plutchik, Robert, and Henry Kellerman. *The Measurement Of Emotions*. San Diego: Academic Press, Inc., 1989. Print.

Plutchik, Robert. *Emotion: A Psychoevolutionary Synthesis*. New York: Harper & Row, 1980. Print.

Plutchik, Robert. "Measuring Emotions And Their Derivatives." *Emotion: Theory, Research And Experience*. Robert Plutchik and Henry Kellerman. San Diego: Academic Press, Inc., 1989. 2. Print.

Pollreisz, David, and Nima TaheriNejad. "A Simple Algorithm For Emotion Recognition, Using Physiological Signals Of A Smart Watch." *39Th Annual International Conference Of The IEEE Engineering In Medicine And Biology Society*. 2017. Print.

Prager, Dennis. "What Is Nachas?." *Jewish Journal*. N.p., 2022. Web. 22 July 2022.

Primack, Brian A. et al. "Social Media Use And Perceived Social Isolation Among Young Adults In The U.S.." *American Journal of Preventive Medicine* 53.1 (2017): 1-8. Web.

"Quantified Self: Measuring Our Well-Being | Nesta." *Nesta.org.uk*. N.p., 2015. Web. 18 July 2015.

Regnault, Antoine, et al. “Towards the Use of Mixed Methods Inquiry as Best Practice in Health Outcomes Research.” *Journal of Patient-Reported Outcomes*, U.S. National Library of Medicine, 2017, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5934918/.

Reisberg, Daniel, and Paula Hertel. *Memory And Emotion*. 1st ed. Oxford: Oxford University Press, 2004. Print.

Rettner, Rachael. "What Is The Quantified Self?." *LiveScience.com*. N.p., 2013. Web. 18 July 2015.

RICH, FRANK. "STAGE: 'MISERABLES,' MUSICAL VERSION OPENS ON BROADWAY." *Nytimes.com*. N.p., 2016. Web. 19 Dec. 2016.

Röggla, Thomas, Chen Wang, and Pablo S. César. "Analysing Audience Response To Performing Events." *Proceedings of the 23rd ACM international conference on Multimedia*(2015): n. pag. Web. 29 June 2022.

Rohd, Michael. "Translations: Engaging Engagement." *HowlRound*. N.p., 2017. Web. 12 June 2017.

Ross, Jerry, and Richard Adler. "Damn Yankees." *Music Theatre International*. N.p., 2022. Web. 27 June 2022.

Rostami, Asreen et al. "Bio-Sensed And Embodied Participation In Interactive Performance." *Proceedings of the Eleventh International Conference on Tangible, Embedded, and Embodied Interaction* (2017): n. pag. Web. 29 June 2022.

Rottenberg, Jonathan, Rebecca Ray, and James Gross. "Emotion Elicitation Using Films." *Handbook Of Emotion Elicitation And Assessment*. James Coan and John Allen. Oxford: Oxford University Press, 2007. Print.

Rozik, Eli. "The Roots Of Theatre: Rethinking Ritual And Other Theories Of Origin." *Journal of Religion and Theatre* 2.1 (2003): 105, 347. Print.

Russell, James A. "A Circumplex Model Of Affect.." *Journal of Personality and Social Psychology* 39.6 (1980): 1161-1178. Web.

Safdar, Saba et al. "Variations Of Emotional Display Rules Within And Across Cultures: A Comparison Between Canada, USA, And Japan.." *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement* 41.1 (2009): 1-10. Web.

Salazar-López, E. et al. "The Mental And Subjective Skin: Emotion, Empathy, Feelings And Thermography." *Consciousness and Cognition* 34 (2015): 149-162. Web.

Saldaña, Johnny. *The Coding Manual For Qualitative Researchers*. 4th ed. London: SAGE, 2021. Print.

Salmela, M. "Collective Emotions As “The Glue” Of Group Solidarity.." *Solidarity: Theory And Practice*. A. Laitinen and A. B. Pessi. Lanham: Lexington Books, 2014. 8. Print.

Sapolsky, Robert. "When Stress Rises, Empathy Suffers." *WSJ*. N.p., 2016. Web. 26 Sept. 2016.

Saxe, Leonard, Denise Dougherty, and Theodore Cross. "The Validity Of Polygraph Testing: Scientific Analysis And Public Controversy.." *American Psychologist* 40.3 (1985): 355-366. Web.

Saxon, Theresa. *American Theatre: History, Context, Form*. Edinburgh: Edinburgh University Press, 2011. Print.

Saxon, Theresa. "Noises Off: UK Theatre Audiences Have Always Been A Rowdy Lot." *The Conversation*. N.p., 2017. Web. 28 Dec. 2017.

Schechner, Richard, and Mady Schuman. *Ritual, Play And Performance*. New York: Seabury Press, 1976. Print.

Scherer, K. R. "What Are Emotions? And How Can They Be Measured?." *Social Science Information* 44.4 (2005): 695-729. Web.

Scherer, Klaus R. "Which Emotions Can Be Induced By Music? What Are The Underlying Mechanisms? And How Can We Measure Them?." *Journal of New Music Research* 33.3 (2004): 239-251. Web. 30 Dec. 2016.

Schwartz, B. G. et al. "Emotional Stressors Trigger Cardiovascular Events." *International Journal of Clinical Practice* 66.7 (2012): 631-639. Web. 1 June 2022.

ScienceDaily. "Laughter Is The Best Medicine? The Emotional Appeal Of Stand-Up Comedy." *ScienceDaily*. N.p., 2014. Web. 2 Feb. 2022.

Sedgman, Kirsty. *Locating the Audience: How People Found Value in National Theatre Wales*. Intellect Books, 2016.

Sedgman, Kirsty. *The Reasonable Audience: Theatre Etiquette, Behaviour Policing, and the Live Performance Experience*. Palgrave Macmillan, 2018.

Sherwood, Harriet. "50% Of UK Theatres Streaming Shows Online During Covid Revert To In-Person Only." *The Guardian* 2021. Web. 2 Dec. 2021.

Simpson, James. Everything You Need To Know About Acting For Film. Lulu.com, 2019. Print.

Singer, Barry. "THEATER; The New Musical: Will Corporate Money Call The Tune?." *The New York Times* 1998. Web. 31 Jan. 2022.

Somerville, Matthew. “Hampstead Theatre.” *Theatricalia*, https://theatricalia.com/place/d2/hampstead-theatre.

Soyyilmaz, Demet. "The Implicit Association Test (IAT)." *Imotions*. N.p., 2015. Web. 31 May 2022.

Spector, Robert. "The Pupils." *Butterworths* (1990): n. pag. Web. 16 Aug. 2016.

Steers, Mai-Ly N., Robert E. Wickham, and Linda K. Acitelli. "Seeing Everyone Else's Highlight Reels: How Facebook Usage Is Linked To Depressive Symptoms." *Journal of Social and Clinical Psychology* 33.8 (2014): 701-731. Web. 8 Nov. 2021.

Stern, Robert M., and Nancy L. Lewis. "ABILITY OF ACTORS TO CONTROL THEIR GSRS AND EXPRESS EMOTIONS." *Psychophysiology* 4.3 (1968): 294-299. Web.

Stern, Robert Morris, William J Ray, and Karen S Quigley. *Psychophysiological Recording*. Oxford [etc.]: Oxford University Press, 2006. Print.

Sumi, Glenn. "What Is It Like To Premiere A Zoom Play? - NOW Magazine." *NOW Magazine*. N.p., 2020. Web. 28 May 2022.

Swarbrick, Susan. "The Art Of A Sex Scene: Vanessa Coffey On How She Creates On-Screen Intimacy." *HeraldScotland*. N.p., 2021. Web. 20 May 2022.

Szubartowska, Malgorzata. "On The Political Uses Of Orchestrated Laughter: From The Claque To Canned Laughter." *Histories Of Laughter And Laughter In History*. Rafał Borysławski, Justyna Jajszczok and Jakub Wolff. Cambridge Scholars Publishing, 2016. Print.

Taylor & Francis. "Laughter Is The Best Medicine? The Emotional Appeal Of Stand-Up Comedy." *ScienceDaily*. N.p., 2017. Web. 9 May 2017.

Taylor, Philip. *Applied Theatre*. Portsmouth, N.H.: Heinemann, 2003. Print.

Tenenbaum, Gershon, and Edson Filho. "Measurement Considerations In Performance Psychology." *Performance Psychology* (2016): 31-44. Web. 1 July 2022.

"The Athens Dialogues." *Athensdialogues.chs.harvard.edu*. N.p., 2016. Web. 21 Sept. 2016.

"The Emotional Combinations That Make Stories Go Viral." *Harvard Business Review*. N.p., 2016. Web. 15 Nov. 2016.

"The Limits Of Empathy." *Harvard Business Review*. N.p., 2016. Web. 14 Mar. 2016.

The New York Daily News. "'The Lion King' Musical Breaks Box Office Record With $6.2 Billion Worldwide." 2014. Web. 31 Jan. 2022.

"The Nine Ingredients That Make Great Content." N.p., 2016. Web. 15 Nov. 2016.

"The Sanford Meisner Center - History." *The Sanford Meisner Center*. N.p., 2017. Web. 12 Mar. 2017.

"Theater Talk With Estelle Parsons | Amnewyork." *amNewYork*. N.p., 2004. Web. 25 Nov. 2021.

Thoma, Myriam V. et al. "The Effect Of Music On The Human Stress Response." *PLoS ONE*8.8 (2013): e70156. Web.

Thomas, Zoe. "Netflix Gets 16 Million New Sign-Ups Thanks To Lockdown." *BBC News*. N.p., 2020. Web. 17 Nov. 2021.

Towle, George M. *American Society*. Chapman and Hall, 1870.

Troilo, Gabriele, Maria Cristina Cito, and Isabella Soscia. "Repurchase Behavior In The Performing Arts: Do Emotions Matter Without Involvement?." *Psychology & Marketing*31.8 (2014): 635-646. Web.

"U.S. Patterns Of Arts Participation." *Arts.gov*. N.p., 2017. Web. 3 Mar. 2022.

UC Davis Health, Sports Medicine and Sports Performance. "Heart Rate | UC Davis Sports Medicine." *Ucdmc.ucdavis.edu*. N.p., 2018. Web. 10 Jan. 2018.

Viagas, Robert. "Audience Member Tries To Use Stage Outlet To Charge Phone At Hand To God." *Playbill*. N.p., 2015. Web. 20 May 2022.

"Vital Signs Camera - Philips On The App Store." *App Store*. N.p., 2015. Web. 11 Sept. 2015.

Wakefield, Jane. "Comedy Club Charges Per Laugh With Facial Recognition - BBC News." *BBC News*. N.p., 2014. Web. 26 Sept. 2016.

Wallace, Rebecca. "Coded (2021) Highlights.Pdf." *https://cltc.org*. N.p., 2021. Web. 10 May 2022.

Wallbott, Harald, and Klaus Scherer. "Assessing Emotion By Questionnaire." *Emotion: Theory, Research And Experience*. Robert Plutchik and Henry Kellerman. San Diego: Academic Press Inc, 2009. 56. Print.

Wallisch, Jenny. "Beyond Livestreaming: Remote Theatre Attendance Through Virtual Reality (VR) — AMT Lab @ CMU." *AMT Lab @ CMU*. N.p., 2021. Web. 16 Nov. 2021.

Walmsley, Ben. "“A Big Part Of My Life”: A Qualitative Study Of The Impact Of Theatre." *Arts Marketing: An International Journal* 3.1 (2013): 73-87. Web.

Walmsley, Ben. "Why People Go To The Theatre: A Qualitative Study Of Audience Motivation." *Journal of Customer Behaviour* 10.4 (2011): 335-351. Web.

Wang, Chen et al. "How Are We Connected? - Measuring Audience Galvanic Skin Response Of Connected Performances." *Proceedings of the 3rd International Conference on Physiological Computing Systems* (2016): n. pag. Web. 7 July 2022.

Wang, Chen et al. "Quantifying Audience Experience In The Wild: Heuristics For Developing And Deploying A Biosensor Infrastructure In Theaters." *2016 Eighth International Conference On Quality Of Multimedia Experience (Qomex)*. 2016. Web. 31 May 2022.

Wang, Chen et al. "Sensing Audience Response – Beyond One Way Streaming Of Live Performances." *Core.ac.uk*. N.p., 2013. Web. 7 July 2022.

Wang, Chen, and Pablo Cesar. "Do We React In The Same Manner?." *Proceedings of the 8th Nordic Conference on Human-Computer Interaction: Fun, Fast, Foundational* (2014): n. pag. Web. 7 July 2022.

Wang, Chen, and Pablo Cesar. "The Play Is A Hit." *Proceedings of the 2017 ACM SIGCHI Conference on Creativity and Cognition* (2017): n. pag. Web. 29 June 2022.

Watling, Giles. "The Impact Of COVID-19 On The UK'S Theatre Industry." *Uktheatre.org*. N.p., 2020. Web. 3 June 2022.

Weaver-Stoesz, Phil. "Immersion, Coercion, And Mutiny: How Do We Set Rules For The Audience?." *HowlRound*. N.p., 2016. Web. 31 Dec. 2016.

Welss, Claudia. "The Power And Awe Of Seeing Earth From Space - Apogeo Spatial." *Apogeo Spatial*. N.p., 2019. Web. 18 May 2022.

"What Are Those Squiggly Lines On CNN Telling You?." *The American Prospect*. N.p., 2016. Web. 17 May 2016.

"What Is Cloud Seeding?." *Desert Research Institute*. N.p., 2022. Web. 31 Jan. 2022.

"What Is The Face Recognition Technology Used In Arrivals Smartgate?." *Border.gov.au*. N.p., 2016. Web. 26 Sept. 2016.

"What Mindfullness Is... And Isn't." *Daniel Goleman*. N.p., 2016. Web. 14 Mar. 2016.

White, T.R, and A.M Hede. Using Narrative Inquiry To Explore The Impact Of Art On Individuals. 2008. Print.

Wieland, Jacob L. et al. "Towards Biometric Assessment Of Audience Affect." *Proceedings of the ACM International Conference on Interactive Experiences for TV and Online Video*(2016): n. pag. Web. 29 June 2022.

Wilder, Joseph. *Stimulus And Response*. Burlington: Elsevier Science, 2014. Print.

Willet, J. The Theatre Of Bertold Brecht: A Study From Eight Aspects. London: Methuen, 1977. Print.

Wilson, Glenn. "The Psychology Of Performing Arts: Theatre And Human Expression." *Gresham.ac.uk*. N.p., 2009. Web. 1 Jan. 2017.

Wolf, Karsten. "Measuring Facial Expression Of Emotion." *Dialogues in Clinical Neuroscience*17.4 (2015): 457. Web. 26 Sept. 2016.

Woodruff, Paul. "Sharing Emotions Through Theater: The Greek Way." *Philosophy East and West* 66.1 (2016): 146-151. Web.

Wright, KC. "8 Acting Techniques (And The Stars Who Swear By Them)." *Backstage.com*. N.p., 2014. Web. 12 Mar. 2017.

Wu, Ming-Ying, Kuan-Lin Chen, and Yu-Chun Huang. "A Smart Bracelet: An Alternative Interfaces Between Performer And Audience." *CAADRIA proceedings* (2016): n. pag. Web. 29 June 2022.

Young, P.T. "Feeling And Emotion." *Handbook Of General Psychology*. B.B. Wolman. Englewood Cliffs, New Jersey: Prentice-Hall, 1973. Print.

Zillmann, Dolf. "Mechanisms Of Emotional Involvement With Drama." *Poetics* 23.1-2 (1995): 33-51. Web.