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Getting Under Your Skin Until You Jump Out of It: The Psychological Effects of Music on The Experience of Film

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by

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Dedication

To My Teachers.

Acknowledgements

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You are the music in me! <3

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Abstract

Music is like magic. It can sweep you off your feet and spirit you away to places you never thought possible: it can serve as a teleportation device, achieve time travel, and let us read minds. Some pieces of music exist for their own sake, like Rachmaninoff's *Isle of the Dead*, while others accompany different forms of media: ballets such as *The Nutcracker* and operas like *La Bohème* are instantly recognizable for their grandiose and immersive scores. For a moment in time, audiences can really believe that they are traveling to a magical world with Clara, and even without the stage one can see in their mind's eye a looming and grave island of mortality… and it's thanks to the music. This paper looks to examine the influential effects of music from a psychological perspective through the lens of film. Looking at three classic horror movies, *Psycho*, *Halloween*, and *Scream*, I aim to illustrate how music plays with our expectations to influence our perceptions of the screen and beyond.

Introduction

We all have a soundtrack to our life stories. Curated through vinyl records or cassette tapes, burnt CDs and online collections, everyone has music to accompany them throughout their lives. There are different playlists for different moods and seasons, different times of day, Mondays and Tuesdays versus Fridays and Saturdays. Although we may not be aware of it, our chosen soundtracks frame the lives in which we live, enrich the narrative, and influence our perceptions of the world around us. It helps to know, perhaps, that if your life were a movie it would have a great soundtrack. A literal track record, one could say, one that perfectly captures those moods and seasons, holidays and tough times. When you revisit a book, you often experience different emotions and interpretations from the first time you read it. Music, on the other hand, has the special power to trigger the very same emotions in a listener as the first time that they heard the tune. Every time you watch the first ten minutes of Pixar's *Up* (2009), you are bound to cry. It is also why a lump can form in the back of your throat upon hearing the theme of the Shire from *The Lord of the Rings*, feeling a sense of nostalgia for a place you've never been. You pause after the first ten or twenty minutes, bleary-eyed, asking 'why am I crying *already*?'

Music, and its characteristics, is why.

But why music?

Film as a medium is peculiar in that its means of consumption are not far from how we engage with our everyday lives. Throughout daily life we are constantly bombarded with information from literally every angle — our five senses are *always* active, receiving sounds, lights, feelings, tastes, and smells. However, our brains can only 'keep tabs' on so many of these details at once, and most of the time these details are not particularly relevant anyway: a picture

hanging on the wall is a nice touch, but is not going to help with homework; and birdsong as dawn breaks is beautiful, but our morning routines don't have to be interrupted by the energy and focus of active listening. Our brains save us a lot of time and headaches by automatically sorting one's environment by relevance, from the task in front of you to the curtains in your periphery. This system of organization is also what allows us to make quick and accurate associations from information we have gathered and sorted over time: 'yellow' is often immediately tied to lemons, bananas, school buses and pencils, for example.

Psychologists refer to this system as the workings of *schema theory*; in other words, schemas are the brain's organizational structures that allow us to 'tune' our attention to what is important and make sense of any given circumstance; some things are easily identified and remembered while others are forgotten. A classic example of this that anyone can try is the "selective attention test" study conducted by Simons and Chabris (1999). A short clip about a minute long instructs the viewer to do one thing: count how many times a ball is passed between different-colored teams. It is a fairly easy task that most participants can do without difficulty, but they often miss the giant full-body gorilla costume that walks across the screen in the middle of the commotion. When not counting ball passes the gorilla sticks out like a sore thumb, but our selective attention is so focused on the passing of the ball that we do not register anything else as important, thus missing other details such as the gorilla. This is a clear example of how our attention can be predisposed to notice certain things and discard others, and how this can happen automatically (Simons & Chabris, 1999).

So what does this have to do with music and film?

An experiment by Boltz (2001) combined explicit principles of schema theory with music and film to see if music can influence our interpretations of what details are important — and

thus remembered — when watching a film. Her lab found that music does indeed influence not only our interpretations of narrative film structure, but also character traits and what physical details we note *even when watching the same scene*. For example, for viewers watching a neutral scene from Hitchcock's *Vertigo* with 'negative music' — minor keys, atonality and dissonance, unsteady rhythm — interpreted the scene more violently and remembered more negatively associated objects like tombstones and dark alleyways, even misremembering objects that were not in the scene at all. On the other hand, positive music accompaniment yielded more romantic character interpretations and remembrance of 'happier' items such as flower bouquets and warm candlelight (Boltz, 2001). Interestingly, Boltz's findings illustrate that music can indeed influence selective attention to the point that we can misremember details that support the conclusion we come to. In short, music can use schema theory to its advantage by playing with our associations relating to certain tonalities (e.g. major vs. minor) and structural components in the music, thus influencing the direction of our attention towards certain details and away from others. This guidance of attention then primes us to interpret certain details of the scene that are more directly related to the unfolding of the story at hand.

Music can take advantage of schemas and selective attention by using certain structural traits to conform to or subvert what is physically happening on-screen, specifically in the form of the Congruence-Association Model (CAM) developed by Marshall and Cohen (1988). This model functions on the basis of schema theory in terms of 'sorting by relevance' to what is happening on the screen; just as we parse information in real life, so do we when watching films. In short, the CAM argues that our brain combines and simplifies multiple sensory inputs through congruence to the film and applicable associations of meanings from our memories to develop a *working narrative* (Cohen, 2013). The working narrative is the culmination of processes that

occur when experiencing a form of narrative media to create a functional story. In other words, the Congruence-Association model posits that we interpret film stories using bottom-up processing of what is presently happening and apply meaning to the media via top-down processing of associated inferences that we have learned over time (Cohen, 2016). Just as building schemas requires experience, so does our ability to apply meaning to external situations in the way the CAM describes, such as the anthropomorphization of moving shapes or the influence of their characteristics based on music. It is why we know how to ascribe tenderness and sadness to music played in minor keys, as we have learned over time that minor keys in music often indicate sadness (Banwisher, 2013) (but more on that later).

Using the famous animation by Heider and Simmel (1944) in which an animated square, circle, and triangle 'interact' with each other, Marshall and Cohen found that pieces of music which structurally matched with the physical action of a character — rhythm and pattern accents, specifically — influenced the interpretation of that shape as a more or less active/dominant character in the situation (Marshall & Cohen, 1988). The CAM has grown in complexity since its original proposal in 1988, expanding to include multiple complicating 'surfaces' of input in the film: text, speech, visuals, music, sound FX, and kinesthetic (See Fig. 1). Combining this model with Boltz's schema theory as it relates to music and film, the meanings we derive from a film come from the associations we make as influenced by the music being played; happy music may guide our attention to create a more positive working narrative as our associations with happiness are applied to the *meaning* of the film (see Fig. 1). "The audience takes what is needed from music and discards or ignores the rest," (Cohen, 2016, p. 728) and so the choices composers make better count for something.

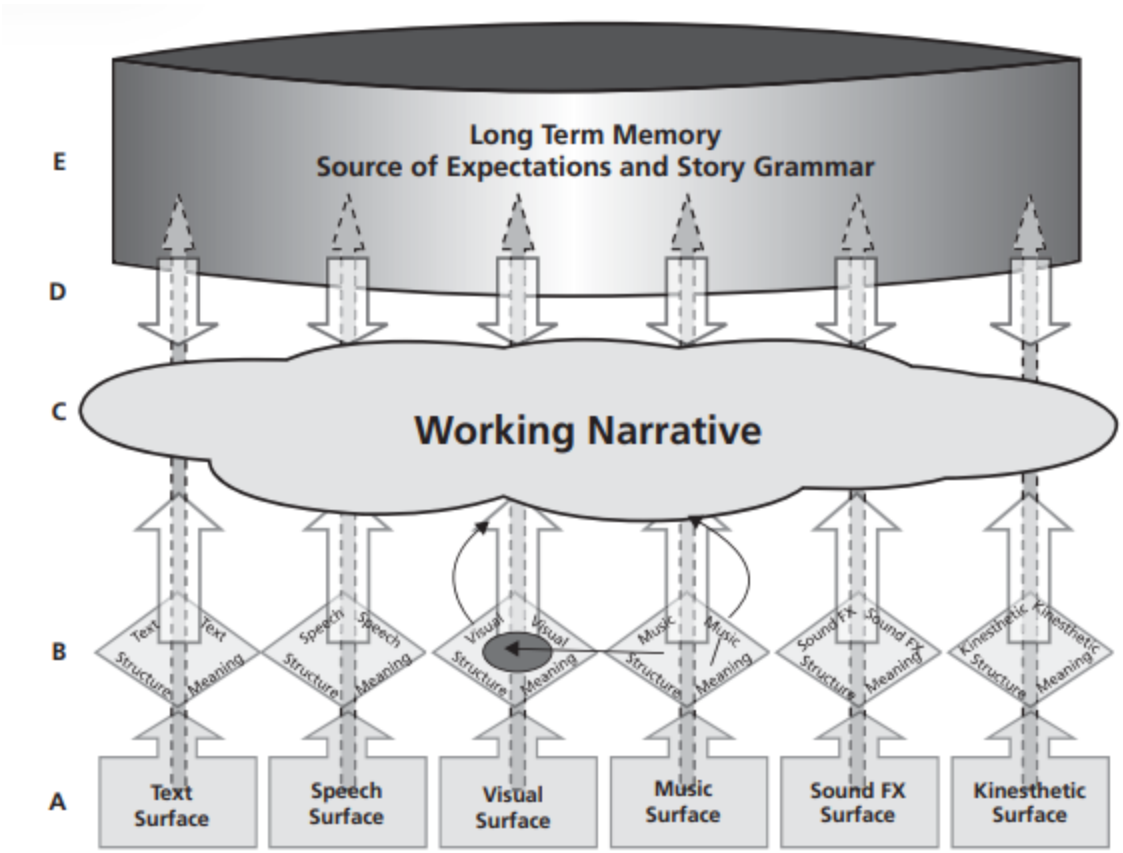

Fig. 1 - Congruence Association Model, iteration 4 (Cohen, 2016, p. 731)

The Importance of Music Theory

To understand how music can functionally influence the meaning of a film, it is most useful to understand the workings of not only psychology but music itself. As Banwisher (2013) well puts it, "understanding the structure of a musical work profoundly benefits our understanding of how it functions in multimedia" (p. 91) However, there are a few points to consider before diving in.

In general, the very methodological structures of music theory and psychology are fundamentally different, posing a challenge for those who wish to combine the two into a single field of study. For one, terms are considered differently: while music theorists view 'perception' as "conscious and volitional", psychologists see perception as "involuntary and reflexive" (Banwisher, 2013, p. 90). One can see why a problem can arise from these differences: if a music theorist and a psychologist were to speak about perception, they would be having two different conversations about the same word. Thus, for the purposes of this paper, 'perception' shall be considered psychologically, as a precognitive and instinctive aspect of life experience. The second big issue is that, despite the Western standardization of pitch and tuning systems, it's quite hard to 'standardize' a single note or piece of music in such a way that is objectively observable. This is why, despite efforts, the codification of specific keys as 'harsh' or 'sensual' is more or less fruitless; a performance rarely displays a scale in the same way as the scale is practiced (simple down-up-down), using rhythm, dynamics, and instrumentation to make every piece unique.

Happy vs Sad?

With that said, why does the connection of 'happy' and 'sad' with 'major' and 'minor' prevail? On one hand, it is the outcome of academics' efforts to translate their specific analysis of music to easier-to-understand broader theories, resulting in oversimplification and generalization of concepts. The codification of different musical key signatures and scales into such terms of 'happy' and 'sad' is as old as Western Thought itself, and highly dependent on *tuning theory*, the mathematical understanding of scale structures whose explanation and interactions call for another paper altogether. To put simply, our very perception of music itself is dependent on the *tuning systems* with which we are familiar. Tuning systems are the different ways that cultures and eras space intervals in a scale, each based on mathematical ratios and consonances of sound wavelengths. Staying in the Western scope, the tuning system we use in our present scales is not the same system used even in the 18th century: if we were to hear a well-known piece in the classical canon in its original tuning, it would sound strange in a way one may not be able to place. The same is true for contemporaneous international tuning systems; as such, the sound of an East Asian instrument tuned correctly may sound 'bizarre' or 'exotic' to the Western ear, even if the instrument were to play a familiar piece. This is an important note to make, as the arguments in this paper are based on Western understanding and development of music – application of these same arguments to international media reflective of a different musical worldview would not hold water. However, this does not discount or devalue the Western scope of this paper, for the psychological concepts and argumentative foundations will be hopefully inter-culturally applicable.

Banwisher (2013) ventures to explain this attempted standardization of music and its effects by examining Samuel Barber's evocatively ambiguous *Adagio for Strings* (1936), a piece

used in multiple films and studies that has the power to evoke both positive and negative interpretations. On one hand, Boltz (2001) qualifies the piece as positive "on the basis of structural parameters identified in the past literature as conveying positive" music, said parameters being "major mode; slow regular tempo; rhythm in a triple meter; wide pitch range with melodic phrases" (p. 434). On the other hand, many studies have employed Barber's *Adagio* as a 'negatively' functioning piece of music, "characterized by very slow tempos, minor harmonies, and fairly constant pitch ranges and dynamics" (Krumhasl, 1997, as cited in Banwisher, 2013, p. 93). Even more, studies have found the *Adagio* capable of eliciting positive and negative states at the same time, what Banwisher names a *dynamic-valence response*. This response reflects the harmonic ambiguity of the piece, describing it as "sad *but* hopeful" and noting both its positive and negative valences. How can all of these different conclusions – positive, negative, mixed – all be made, and what is to explain for them? This is where the understanding of music and its functions can be helpful and even necessary.

Psychological Codification of Music

First and foremost, despite the somewhat arbitrary means of organizing and characterizing scales and modes, there is some psychological basis to our generalization of major scales as 'happy' and minor scales as 'sad.' Indeed, Heinlein (1928) and Hevner (1935), as cited in Banwisher (2013), conducted experiments that have since been heavily reproduced and replicated which indicate that listeners do naturally associate major scales with 'happy' adjectives, and minor scales with 'sad' ones (Banwisher, 2013). These findings lend credence to the idea that certain 'modes' of music do in fact have some degree of affective consistency. Furthermore, studies have found that the body and the brain physiologically respond accordingly to 'happy' or 'sad' music (Powell, 2016, p. 37). Other structural components of music, such as

rhythm, pitch, harmony, and tempo have notable influence on the perception of emotion in a piece, to the point that tempo can change the mood of a song regardless of its major or minor mode. The chart below summarizes the general effects that different structural variations can have on the perception of the listener.

	Happiness	**Fear**	**Anger**	**Tenderness**	**Sadness**
Tempo (speed)	Fast, steady	Fast, varied	Fast, steady	Slow, steady	Slow, varied
Key type	Major	Minor	Minor	Major	Minor
Average pitch	High	High	High	Low	Low
Pitch variation	High	High	Moderate	Low	Low
Harmony type	Consonant	Dissonant	Dissonant	Consonant	Dissonant
Loudness	Medium to loud, steady	Quiet but variable	Loud, steady	Medium to quiet, steady	Quiet but variable

Table 1 - Summary of musical characteristics associated with specific emotions. (Powell, 2016, p. 37)

Knowing this information, one could begin to functionally dissect a piece and gather important information as to why said piece has a particular emotional effect. Returning then to Banwisher's analysis of Barber's *Adagio*, an explanation for the potential of the dynamic-valence response arises. While the piece itself is written in B-flat minor, its harmonic progressions lean toward the dominant F Major and submediant G-flat Major. Of 13 cadences, 11 are major, 9 of which are specifically F Major; continuing to emphasize the dominant of the key allows for the implication of B-flat minor to persist but not rule the tonal center (Banwisher, 2013). Quite

literally, sadness is implied as happiness prevails above. Furthermore, the piece's pitch average and variation primarily reflect the named characteristics of tenderness and happiness, as indicated by table 1.

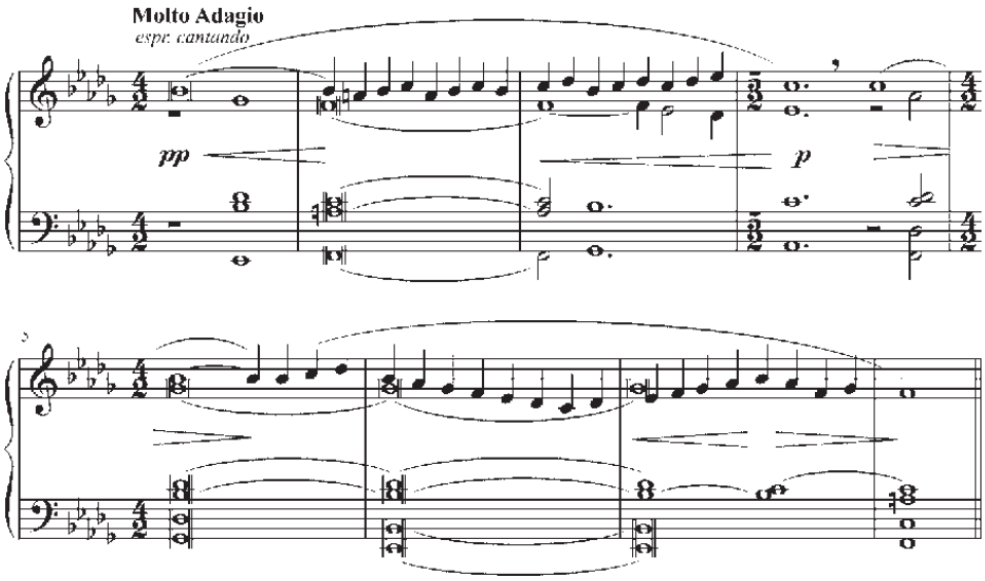

Fig. 2 - The first 8 measures of Barber's *Adagio for Strings*. (Banwisher, 2013, p. 92)

Although the piece is written in 4/2, the tempo is more often aurally recognized as triple meter, meaning that three notes are grouped to a perceived beat. This impression is given because of the melodic sequencing of pitches as generally ascending or descending in groups of three – A, B-flat, C… B-flat, C, D-flat… C, D-flat, E-flat… and so on. The feeling is further compounded by the irregularity of harmonic change; rather than changing evenly on the whole note (four beats) the harmony generally progresses by the dotted half note (six beats). Globally, the piece follows an upward trajectory; that is, despite some dips and valleys (as seen in mm. 6 in Fig. 2), the music continually ascends in pitch, and the gaps between the upper and lower registers of the orchestra become wider until the upper strings soar at an A7-sharp over middle C4. As the piece progresses, the rate of harmonic change also becomes more regular, changing

every whole note and rising with the tension to eventually change with nearly every movement of the strings at the climax of the piece. Identifying these functional musical changes can then better connect the piece to its emotional perceptibility: As the piece develops from low pitch registers and irregular timing to higher, more excitable registers with more consistent harmonic and rhythmic change, one can recognize how tenderness and sadness can turn to happiness and hope and see how the dynamic-valence response of 'sad *but* hopeful' is indeed possible as musical component develop and interact with each other.

With so many working variables in play, it can be difficult and overwhelming to attempt and keep track of all the moving details in a piece of music. Indeed, the variation of composition is so broad that the identification of smaller, hyper specific concepts would not help in drawing sound, generative conclusions. Thus, it may be more useful to parse out the main structural components of music that have the highest potential to influence our attention. These are as follows: instrumentation, dynamics, silence, and diegesis. The goal of this paper is to examine each musical component in a functional context to illustrate the psychological power that music holds over our experience of movies, ultimately demonstrating the influence that music has over our own adventures in life.

Thematic Material and Memory

A large psychological power that music has always wielded independently, further emphasized by combinations with other media, is that to establish connections between melodies and external ideas. This is accomplished through the employment of the *leitmotif*, a specified musical phrase that is directly referential to a narrative idea, oftentimes a character, an object, or a place (Cooke, 2008); through strengthening of such associations, leitmotifs can wield particular narrative importance by repeating established themes at crucial moments to reinforce a particular

point (p. 82). Richard Wagner is generally credited with popularizing the leitmotif in programmatic music, most famously in *The Ring of Nibelung* (1876), a cycle of musical epics for which employment of leitmotifs was "primarily motivated by dramatic and not musical necessities" (Cooke, 2008, p. 80).

As media and its accompaniments have evolved from stage to screen, so has the employment of the leitmotif. Perhaps the most comparable employment of leitmotifs in film to Wagnerian dramas was accomplished by none other than Howard Shore in scoring the world of J.R.R. Tolkien's *Lord of the Rings*. Throughout 11 or so hours of film, themes are developed for almost every different place, every important character dynamic, and of course the One Ring. From the first moment, the use of such leitmotifs guides the audience through an entire mythological history without overwhelming or breaking their suspension of disbelief — instead it is better upheld. This is supported by models of memory that posit learning to improve with repetition, such as information as per Pavlov and Skinner's respective Classical and Operant Conditioning; as well as Atkinson & Shiffrin's Multi-Store Model of memory (Gluck et al., 2020). In short, conditioning is the process through which we learn that one thing leads to another, either with (operant) or without (classical) our involvement. Atkinson & Shiffrin's Model of memory refers to the process through which present life is experienced and encoded through sensory memory, Short Term Memory (STM), and Long Term Memory (LTM). An important note regarding this model is that information in STM that is unrehearsed is lost — not forgotten, but never even learned in the first place (Gluck et al., 2020). Thus, through repetition of stimuli, associations are strengthened and meanings of previous scenes can be more easily recalled and abstracted to the present moment. Although this process is automatic, it targets declarative memory relating to personal experiences (episodic memory) and world facts

(semantic memory) (Hoeckner & Nusbaum, 2013). Indeed, our entire understanding of the world — our knowledge of what a birthday is, where state capitals are, and how to do laundry — is informed by our experiences of it: the birthday parties we've attended, the geography tests we've taken, and the household chores we do throughout our entire lives. Music is certainly not excluded from this experiential learning: the quickest cue as to *what* formal event one is at can come down to whether one hears Elgar's *Pomp & Circumstance*, Pachelbel's *Canon in D*, or Wagner's "Bridal Chorus." This aural function of learning is what gives power to the leitmotif, and why the proper use of thematic material can be crucial to the life of a film.

Musical Components

Instrumentation

The *instrumentation* of music refers to the actual list of instruments called to play a piece. In a hoity academic setting it is called *orchestration*, which can more specifically refer to the actual arrangement of an orchestra to achieve a particular effect. Nonetheless, these terms can and have been used synonymously, but for the purposes of generalizability and simplicity, this paper will employ the term *instrumentation*. In other words, instrumentation is the instrumental make-up of an ensemble; a string quartet literally has a different instrumentation from a brass choir, for example. Because of this potential for large change in sound, instrumentation is one of the more 'noticeable' influential components of a music score. It has the power to 'clue us in' to what is happening in a movie, specifically regarding genre and time period. A neutral scene of a landscape could be virtually any place or time in the world; the specific instrumentation of a Spaghetti Western's drop-D tuning and slide guitar, versus the Big Band swing of a James Bond film, allows us to 'zoom in' on the setting at hand (Schrader, 2017). Proper instrumentation is

key for maintaining a suspension of disbelief in a film while allowing for the flexibility to change times and places without confusion. Instrumentation can also influence interpretation of characters by utilizing an apparently evolutionary understanding of dominance and aggression as inversely related to pitch level; lower frequency utterances often indicate dominance while higher-pitched whines suggest submission (Granot & Eitan, 2011). These associations may translate to music and, via congruence to on-screen activity, more threatening and aggressive traits could be imposed on the character.

Dynamics

The term *dynamics* refers to the amplitude – loudness or softness – of a note or phrase in the context of music; if a piece of music has 'a lot of dynamics' that generally means it is very expressive in its use of volume and phrasing. Dynamics are an important indicator of perceived tension in a given scene and can influence our experience at a pre-attentive level (Granot & Eitan, 2011). Taking the concept out of musical context, the amplitude of a sound is most functionally recognized as a means of discerning distance; the quieter something is, the farther away it may be, while an increase in sound level often indicates its approach. This is supported by activation of the amygdala and visual cortex upon increases in loudness as part of the body's stress response to prepare for a potential approaching threat. The amygdala is primarily responsible for the handling of fear in the brain and is a major player in the body's stress-related processes; and activation of the visual cortex primes awareness to improve reaction time and recognition of details to the point where excitation occurs 35ms before the brain's registration of stimuli (Granot & Eitan, 2011). Listeners also often overestimate increases in loudness and underestimate arrival time and distance; in other words, people tend to perceive loud things as being closer and louder than they actually are (Neuhoff, 1998). This illustrates the heightened

attention and anticipation that loud sounds activate as representations of threat. It is important to note that this applies to *any* form of sound, not just music, but the universality of this concept allows the same argument to be made for musical circumstances.

In a broad context, dynamics can be to music what syllabic stress is to speech. It can provide a sense of motion in the music, ebbing and flowing like a wave or dropping like a cliff. A study by Granot and Eitan (2011) has shown a significant main effect of dynamics on tension regardless of musical training, more so than pitch register, contour, and dynamics combined. According to their hypotheses and results, dynamics may be the most powerful tool to manipulate perceived tension. This supports the argument that moments on screen accompanied by increased dynamics will raise the perceived tension of the scene in such a way that heightens attention to in-film events and influences what is noticed and further remembered after the fact.

Diegesis

Diegesis refers to the 'sourcing' of music in a film. If music playing in the film exists in that universe and can be heard by characters, it is diegetic; if it is playing as an underscore to the dialogue or a backing track that is not heard by characters, it is non-diegetic. These two forms are also referred to as 'source music' and 'dramatic score,' respectively (Schrader, 2017). Tan, Spackman, and Wakefield (2017) argue that the placement of music 'in' or 'out' of a scene can significantly influence how the audience applies meaning to the narrative at hand, particularly in regards to character motives and relationships. In fact, switching the diegesis of a single piece of music is more effective than changing pieces altogether. For example, a tense scene in *Minority Report* showed different character interpretations based on the diegetic switching of 'Moon River' being played in an in-movie mall, through the movie loudspeakers, or another piece more mood-congruent (Chase Music) with the action. They found that the overall scene was

“perceived to be more tense and suspenseful in the original diegetic version compared to the Nondiegetic ‘‘Moon River’’ song or Chase Music versions ” (Tan et al., 2017). This is perhaps due to the presence of mood-incongruent music as a juxtaposition to the action on-screen, creating ironic tension; however, it is important to note that the diegetic version of the song was in fact more effective at building tension in the scene than the non-diegetic, suggesting that there is a balance to be hit to achieve musical efficacy in diegesis.

Silence

Silence refers to the marked absence of music or sound in a composition. Many times have music educators uttered the words, ‘the hardest thing and most important to get right about music is silence,’ and they are right. In life, silence often accompanies moments of importance, stillness, reflection, and anticipation. In music, the same is true. Famous musical accents and surprises — such as Beethoven’s Fifth Symphony motif — are only as effective as they are because of how the accompanying silences are handled with care and given space to breathe. In film, silence — the marked absence of music — can indicate to the viewer that a scene of particular importance or high stakes is occurring on-screen and that they should pay particular attention to what is happening. It is an interesting inversion of tension created through dynamics; rather than reacting to a change in sensory input, silence forces the audience to confront what is happening on the screen exactly as it is without the help of musical components and their associations. Music works by playing with our expectations; without its presence there can be no subtle use of foreshadowing or subversion of expectations. In silence our attention is not guided in any certain direction and there is no recognition of theme that may draw a line of connection to a character or plot point… but rather than break suspension of disbelief, the correct use of silence instead suspends the viewer out of time in an inescapable moment of anticipation.

It should be noted that due to difficulties in quantifying the concept of 'silence,' very few studies have looked at potential interactions between silence and psychology, particularly relating to discomfort with silence and sensory deprivation. It would be fruitful to learn *why* many people are afraid of or uncomfortable with silence in a similar way to how others may fear the dark.

Selecting Movies & Genre

In general, each aforementioned component of film music plays with *expectation*. Whether it is contained within the film, learned through life experience, or evolutionarily built into us, our experiences are informed by the relevant possibilities of a given situation and it comes as a surprise to us when such possibilities are not fulfilled. Music can use this to its advantage via instrumentation, dynamics, silence, and diegesis to guide our expectations and either satisfy or subvert them and make a more memorable, visceral experience. The issue at hand, however, is the range of expectation possible in a complex narrative story such as *The Lord of the Rings* or the Marvel Cinematic Universe: these movies connect to audiences in such different and personal ways that it may be impossible to quantify exactly what the music does in these contexts. This is why, for the purposes of this paper, the horror genre is the ideal subject of consideration: they exist for the sole purpose of scaring you.

There is perhaps no other genre of film that utilizes silence, deliberate instrumentation, jarring dynamics, and in-movie melodies like the horror genre. For one, the music of 'horror' is historically based in romantic and gothic musical representations of the supernatural, unexplainable, and unknown. That is to say, before the advent of film and modern codification of 'genre,' structural musical reflections of 'scary' had already been recognized, for example seen in Saint-Saens' *Danse macabre* (1874) which features "melodic distortions, unusually

chromatic or dissonant harmonies and timbral novelty" to evoke the uneasy feeling of the supernatural (Link, 2016). Thus, by the time 'talkies' began to gain steam and further-fetched narratives were drawn, the characteristics of 'fear' music seen in Table 1 had been established. Interestingly though, despite its foundations in the Classical canon, horror music as we know it today found its real steam in late contemporary 19th- and 20th-century experimental composition. Any student of music history is aware of the ferocious 'protection' of Classical Western repertoire from around the 17th century to the late 19th century; historians of Romantic, Classical, and Baroque music often have little to no patience for novel innovations and techniques of modern and postmodern composers — the unknown is not to be tampered with! But this is exactly where music for the horror genre found its footing, in the exploitation of the new and unknown, as "liberal suspensions of disbelief demanded by science fiction and horror engenders acceptance of the unfamiliar" (Link, 2016). This acceptance is what led to the rise of novel instruments such as the theremin, Novachord, and moog synthesizer, for example; and why the techniques and styles of 20th-century composers such as Stravinsky, Ligeti, and Penderecki echo through horror today.

Psychological Concepts Relating to Horror

The horror genre in and of itself holds weighty psychological power as per its ability to evoke strong psycho-physiological reactions. For one, the genre holds an innate connection to the experience of fear: before watching a horror movie, an audience will hold the *apriori* expectation of being scared as past experiences with the genre will have already solidified this connection. Thus, before the film even begins, the audience is *semantically primed* to draw associations between details of the movie (such as music, lighting, characters, setting) and the concept of fear, as per Boltz's rationale (2001). In a way, the audience is then *sensitized* to the

on-screen stimuli; as neurons in the amygdala (the fear center of the brain) fire together with those of the brain's sensory cortex, their relationship is strengthened over time so that the amygdala will be primed to react upon the opening credits of the film and the audience will already be on the edges of their seats (Gluck et al., 2020). This allows for every on-screen stimulus to hold the potential to scare and/or be interpreted with scary meaning.

Horror movies take further advantage of audience sensitization by then drawing out moments of building tension and mounting fear. This is achieved through *delay conditioning*, a form of learning that functions within the framework of Classical Conditioning, which posits learned associations between stimuli and outcomes so that the presentation of a stimulus (S - stimulus) automatically cues the prediction of a certain event (O - outcome) (Gluck et al., 2020). In the context of film music, S is the music associated with a particular character, and O is the appearance of that character; put most simply, our knowledge of the association between the music (S) and the appearance of the character (O) allows the presentation of the music alone to *predict* the appearance of the character. If this appearance, however, is delayed past the point of expectation while the music continues, we process the associations we have made and abstractly connect them to the scene at hand even if the character isn't there. Upon the eventual appearance of the character, the association between the S&O has been processed and strengthened so that the outcome is particularly effective.

Horror movies can combine this form of conditioning with the audience's sensitization to potentially frightening stimuli to achieve a particularly visceral effect of surprise, often via jump-scares after the presentation of 'danger music' without simultaneous congruences present on the screen. In these cases, the recognition of 'danger music' already within the context of expected danger primes the audience to expect the appearance of a particularly fearsome

stimulus; and when the danger appears past the point of expected arrival it is particularly frightening.

Musical Components in Horror

Knowing these details and referring back to Table 1, one can identify specific musical strategies that horror movies employ to achieve their intentions. For example, the characteristics of 'fear' music as described by Table 1are the exact characteristics of Bernard Hermann's famous string score for *Psycho*'s (1960) shower scene: high pitched, in a minor key, fast and varied tempo, and dissonant harmony. The use of synthesizer in John Carpenter's score for *Halloween* (1978) embodies both the supernatural and the machine, both of which are accurate characteristics of the movie's main antagonist 'killing machine.' Alongside playing with expectation, horror movies play with extremes and uncomfortable possibilities via manipulation of sound, and by doing so "frequently plunges inwards towards psychological interiority" (Link, 2016 p. 204). Combining these strategies with the basis of the CAM can allow for horror movies to elicit the most visceral reactions and engagements possible.

Everyone is familiar with those dreadful moments of pure silence before a jump scare, the high-pitched squeak of violins, and the eerie tinkle of a music box or a child singing. Horror movies deliberately use music and its components to their psychological advantage to get under the skin of their audience, divert their attention and scare them from the other direction. As such, this paper will be using three famous horror movies to illustrate this point: Alfred Hitchcock's *Psycho* (1960), John Carpenter's *Halloween* (1978), and Wes Craven's *Scream* (1996).

Hitchcock's *Psycho* (1960), composed by Bernard Herrmann, is responsible for so many horror conventions within and beyond the musical scope, holding unique status for nearly every

aforementioned musical component. For one, Herrmann's choice of instrumentation was unusual but therefore memorable; and the famous shower scene exemplified how synchronicity between music and action could be exploited to maximum effect. This synchronicity in *Psycho* (1960) also played heavily with 'theatre of the mind,' or our ability to scare ourselves via imagination: even though there is no shot of Bates' knife meeting skin, many moviegoers recalled seeing such an image upon the premiere (Cooke, 2008, p. 208), suggesting that our imagination filled in the more gruesome details, in turn scaring the audience even more than the visuals alone. *Psycho*'s score is unique in its distillation of thematic material, made even more atypical by refusing to resolve cadences and sometimes lacking in tonal center, an evocation of more contemporary, rather than classical, composers.

John Carpenter's *Halloween* (1978), scored by Carpenter himself, took heavy influence from Hitchcock in manipulating the film to play with 'theatre of the mind,' forcing the audience to scare themselves with their imaginations before the movie actually did it. This was again accomplished through novel applications of camerawork and lighting, as well as music; and with an incredibly low budget for the time, all of their accomplishments were remarkable in this sense. For one, an iconic and effective instrumentation was brought to the fore of the genre, showing that one didn't necessarily need a complete Black Book or full orchestral accompaniment to effectively elicit a desired reaction (much to Herrmann's chagrin). Secondly, the score itself is very simple and thematically distilled, which allowed for long pauses and silences to be filled with more experimental synthetic sounds that grew to become representational of the spooky. *Halloween* is responsible for many common horror tropes, including 'babysitter murders' and 'the Final Girl.' It also cemented Jamie Lee Curtis' status as

a ‘Scream Queen,’ right alongside her mother Janet Leigh, who most famously portrayed Marion in Hitchcock’s *Psycho*.

Wes Craven’s *Scream* (1996), scored by Marco Beltrami, was written as a love-letter of sorts to iconic slashers such as *Psycho* and *Halloween*. The movie is hyper-meta-referential, with easter eggs hidden throughout the film (I wonder if Billy Loomis has family in Illinois…?) and conventions subverted to play with pre-established expectations of the audience. The soundtrack itself is a combination of lush orchestration (à la Herrmann) and electronic/synthetic sound sources (à la Carpenter), employing sound and music both atmospherically and narratively. As a meta-referential film, *Scream* makes a point to play with common horror tropes such as ‘the Final Girl,’ ‘the Phantom Killer,’ and ‘Everybody’s a Suspect,’ for which Beltrami uses recognizable techniques in horror such as stings, atonality, and extremes of range and dynamics. Although it was Beltrami’s first foray into the horror genre, his careful manipulation of musical components to play with and poke fun at pre-established expectations of the horror genre led his name to become ubiquitous with the sound of the horror genre in the 21st century; he has gone on to further experiment with extended techniques and isolation of such components, responsible for *A Quiet Place* (2018), *Hellboy* (2004), and *World War Z* (2013), to name a few.

All three of these movies – *Psycho*, *Halloween*, and *Scream* – are at once unique and quintessential to the horror genre, paving the way for all movies that came after; and all three movies use music to their own special advantages to create masterpieces of scare. Using these movies and their utilization of musical strategies now conventional to the horror genre, this paper

will argue how particular musical components — specifically instrumentation, dynamics, diegesis, and silence — manipulate our expectations and direct our attention to implicitly influence our experiences, interpretations, and psychological engagements with the information we are presented with. Although the horror genre is the clearest example of this power, the psychological implications found can be further applied in cognitive, social, and clinical contexts. Furthermore, we can take what we learn and understand how the soundtracks of our lives are not just unheard accompaniments, and may in fact help us remember our own stories when they start to slip away.

Instrumentation

We begin our considerations with one of the foundational aspects of any piece of music: instrumentation. As previously defined, *instrumentation* refers to the actual make-up of an ensemble: i.e. which instruments are involved. Instrumentation can impact the harmony, range, and timbre of a piece, changing possible interpretations of time, place, and broader historical contexts. In the context of film, this can extend to the understanding of genre, character traits, and the global working narrative overall. This is all to say that without the consideration of instrumentation and its larger influences, any analyst of music from any perspective would be at a loss. An important note to make regarding instrumentation in particular is that its tendencies and typicalities are often culture- and history-specific. For example, "brass instruments in Hollywood films often indicate bravery, but in a Hindi film they mean that villainy is afoot" (Powell, 2016, p. 100). It is important to keep these distinctions in mind to maintain argumentative consistency and recognize that one effect of music on perception may not be the only effect. That is, after all, the ideal application of modern scientific thought: to pursue knowledge without fear of it.

The clearest example of instrumentation in the context of film is in reference to the audience's general understanding of genre. As aforementioned, the harmonies of a Spaghetti Western are vastly different from those of a James Bond movie, and both thus have an immensely different impact on the interpretation of a single, neutral shot of landscape for example. Under this reasoning, the selection of instruments to be involved with the composition of a movie begins to mean something: Michael Giacchino's choice to solo a muted trumpet with piano and violin in a swinging Waltz for Pixar's *Up* (2009) speaks fondly to an increasingly-antiquated time gone by; and Alexandre Desplat's use of Taiko drums, low-register chants and low walking brass lines in Wes Anderson's *Isle of Dogs* (2019) is an evocative reference to traditional music in Japanese culture, as familiarized to the Western audience through Kurosawa's *Seven Samurai* (1954).

To take advantage of instrumentation is not only to take advantage of global context but to also exploit range and tone. This is an important note to make, as this exploitation functions on the basis of the universal frequency code, a cross-species theory positing that listeners perceive pitch as proportional to size and, by extension, threat (Ohala, 1984). In other words, listeners tend to associate higher-pitched sounds with smaller sources and lower-pitched sounds with larger sources, following the logic that the bigger something is, the more potential it may have to harm us. Studies have shown this pitch-size perception to also apply to musical passages, such that "melodies transposed to lower registers are characterized as more threatening than higher transpositions" (Granot & Eitan, 2011). This can be seen, for example, in *The Lord of the Rings: The Fellowship of the Ring* (2001), in the Mines of Moria with the Balrog and its associated music. Before even appearing on-screen, the music recognizes the Balrog as the most threatening and powerful enemy the Fellowship has yet faced. In silence, all the audience hears

is the low growling of the beast and the clanging of its movement as low chanting voices and drums grow slowly in intensity. Gandalf's recognition of the Balrog as 'beyond any of you' cues loud brass followed by fast strings, imitating the chase that is about to occur. The use of these low tones and instruments/voices with 'large' sounds correlates to the perceived aggression and threat level of the Balrog as a near-insurmountable danger, too big to fight and too dominant to challenge; in this regard, it is almost more fearsome without the visual reveal of the Balrog as the audience conjures images of what great beast it could possibly be. This is an example of how instrumentation and pitch register can influence the expectations of the audience in such a way that increases suspense and anticipation while reasonably dramatizing a potential foe. This particular scene also interacts with dynamics, as we will see later, in signaling the approach of the Balrog.

Psychological Principles

Psychologically speaking, horror can use instrumentation to take advantage of timbre and range in order to display specific emotions and even mimic acoustic features of the human voice. It is already widely agreed upon that music can effectively communicate emotional concepts through key signature and tempo (Banwisher, 2013; Boltz, 2001; Powell, 2016), but studies have suggested that the instruments themselves may have an influence on how emotional music is perceived (Gabrielsson & Juslin, 1996; Luo & Warner, 2020). Gabrielsson and Juslin (1996) found that differences in playing technique and timbre for violin, flute, and guitar accounted for differences in listeners' interpretations: for example, violin was more effective than flute in communicating "anger" by use of 'noisy' and 'sharp' attacks on the string by the performer; and if a composer wants to maximize emotional expression, a guitar is not often the best choice given limitations on dynamics and melodic movement.

As aforementioned, instrumentation also allows for a wide range of pitch registers to be available; by this I mean the 'lowness' or 'highness' of a sound. As also previously mentioned, research has shown a universal 'frequency code' that relates pitch to perceived aggression and threat: higher, whinier pitches tend to indicate friendliness, submission, and fear; low pitches and descending pitch patterns tend to indicate dominance, aggression, and threat (Morton, 1994, as cited in Huron et al., 2006; Ohala, 1984). Furthermore, studies have also found these associations to translate to musical contexts; Huron, Kinney and Precoda (2006) found a strong correlation between octave transposition and perceived threat in that lower transpositions were consistently perceived as more threatening than higher transpositions, and vice versa. However, these perceptions can be influenced by the manipulation of timbre and dynamics to create high-pitched, high-tension musical passages. The horror genre is a large proponent of this, as such manipulations of composition can mimic the sound of a human scream. The scream in and of itself is an evolutionary alarm characterized by high pitch, loudness, and roughness in tone (Trevor et al., 2020). Our alarm systems seem to activate in response to screams through these two characteristics: screams lie in a pitch register and at a level of sound that creates a roughness that is aversive to the ear (Trevor et al., 2020). In fact, Arnal et al. (2015) have observed greater activation in the amygdala, responsible for fear responses, when there is more 'roughness' heard in a scream. By selecting instruments carefully, composers can utilize techniques to create 'rough' and textured sounds, and by raising the pitch height they can accomplish 'scream-like' music; this is supported by Trevor et al.'s (2020) observation that 'scream-like' music is perceived to be particularly rough and negatively valenced, similar to real screams. However, it is not as strong as the real thing, which is where the genius of Bernard Herrmann enters the scene in his choice of instrumentation, discussed later in this chapter.

How Horror Does It

Horror movies in particular take advantage of instrumentation by often employing relatively novel instruments and compositional techniques. Franz Waxman was among the first to draw instrumental conventions in the horror genre, with pulsing timpanis and dissonant brass in *The Bride of Frankenstein* (1935) to represent the rise of a familiar monster in a grander way, and the introduction of the Novachord, an electronic keyboard synthesizer used in *Rebecca* (1940) as a means of representing the unknown and spooky (Cooke, 2008, pp. 100-101). These conventions have persisted in the horror and science fiction genres to Hollywood's present, with the inclusion of the Theremin in *Ghostbusters* (1984) to walk the line between the silly and the uncomfortably unfamiliar, or the fully-synthesized score for *Sinister* (2012) in which composer Christopher Young distorted samples of instruments to the point that they sounded foreign, more reminiscent of unsettling drones and cluster chords found in compositions of Penderecki, Ligeti, and (more recently) Basinki's Disintegration Loops (Ellison, 2012). The use of unconventional instrumentation and technique can also blur the lines between perceived music and sound, further immersing the viewer in the experience while forcing them to relinquish perceptual control over their sensory organization and interpretations of what is 'real' and 'unreal' in the context of the film. This calls back to Marshall and Cohen's CAM, and how congruences of different sensory 'surfaces' can work together to influence a viewer's understanding of the working narrative (refer back to Fig. 1). In the particular case of blurring sound and music, sounds are often not only registered aurally but tactically; the combination of the two can intensify the viscerality of a scene's music and pull the viewer further into the scene (Link, 2016). The blurring of perceptual surfaces may also give rise to confusion, the place the viewer never wants to be and the director

always wants the viewer to be in. In states of confusion, expectations are interrupted, priming an opportunity to potentially scare and/or surprise the viewer more intensely.

Horror movie scores also tend to the extremes of instrumentation, often employing full orchestras or barren orchestrations. This is not necessarily surprising, as the horror music genre has developed under the influence of 20th-century schools of composition such as Minimalism, Atonality, and experimental Electronic music. Young notes that "it's the littlest gesture that can create the most terror in the listener," (Ellison, 2012), as shown by Williams's minor-second *Jaws* (1975) theme that rhythmically nods to Stravinsky's *Rite of Spring* (1913) or Goldsmith's score for *Alien* (1979) which echoes Penderecki's *Threnody* (1961) and Ligeti's *Atmosphères* (1961), which has also been employed in movies about the unknown and the 'beyond.' This is important to note because these pieces in and of themselves are known to create visceral and unpleasant reactions from their audiences due to their use of high dissonance and irregular/non-existent tempi; to then isolate particular components of such pieces for their exploitation of perception on a film is then a reasonable action to take. The rise of electronic music has also facilitated the use of extended techniques such as low frequency beats that can imitate the beating of a heart.

Psycho

Although Herrmanns' programmatic composition to *Psycho* (1960) is now considered a touchstone in the horror genre, the score was a black sheep at the time it was written. Perhaps this is not surprising, as audiences were iconically shocked by the screeching strings accompanying 'The Murder' of Marion… but it is an important note to make nonetheless, as it was a decision very deliberately made and defended by Herrmann himself. What decision was this? To write for a strings-only ensemble, no winds or percussion.

This may not seem like a big deal nowadays, but in Herrmann's time it very much was. In the film canon, string orchestrations were generally seen as appropriate for happier subject matters; this is seen especially in the compositions of Alfred Newman, who used strings-only orchestrations to exploit smooth textures in 'sweeter' contexts (Cooke, 2008, p. 208). The choice of Herrmann to orchestrate *Psycho* for strings-only, then, was a deliberate contrast against contemporary norms. This is further supported by Herrmann's own personal pride in his ability to be hyper-aware of characteristics and color in music as the composer and orchestrator:

> Color is very important. And this whole rubbish of orchestration [by others] is so wrong. You know, they make everything shit. I always tell them, 'Listen, boys. Don't give me this shit. I'll give you a thousand dollars. I'll give you the first page of the *Lohengrin* prelude, with all the instruments marked. You write it out. I bet you won't come within 50 percent of Wagner.' To orchestrate is like a thumbprint. People have a style. I don't understand it, having someone orchestrate. It would be like someone putting color to your paintings (Cooke, 2008. p. 206).

Contrary to Newman, Herrmann wished to exploit the "very cold and very factual" nature that he found to be of string ensembles, an idea supported by the versatility that lies in the nature of the instrument (Cooke, 2008, p. 208). This is to say that the use of strings can facilitate the compositional employment of extended techniques such as frictionless glissandi, harmonic overtone isolation, quartertones, and percussive articulation; the correct employment of which can startle and discomfit an audience that is generally unfamiliar with such instrumental abilities. This is why, although strings-only orchestration was by no means *new*, Herrmann's

compositional decision was still *novel* in changing the familiar to the unfamiliar as a means of instilling fright in an audience.

Circling back to Trevor et al. (2020) and Arnal et al. (2015)'s arguments regarding 'scream-like' music, as well as Gabrielsson & Juslin's (1996) and Luo & Warner's (2020) arguments regarding instrumental timbre and emotion, let us observe *Psycho*'s murder scene as perhaps one of the most famous musical emulations of the 'scream,' in part thanks to Herrmann's choice of orchestration and compositional techniques. Hailstone's (2009), as cited in Luo & Warner (2020), findings regarding emotional perception as influenced by instrument identity corroborate Herrmann's specific argument of the 'cold' and 'factual' nature of the violin by observing that perceptions of 'happiness' in music were significantly less likely ($p < .05$) when performed by a violin as compared to keyboard, brass, and electronic timbres, but intended perceptions of 'anger' were relatively (albeit not significantly) effective.

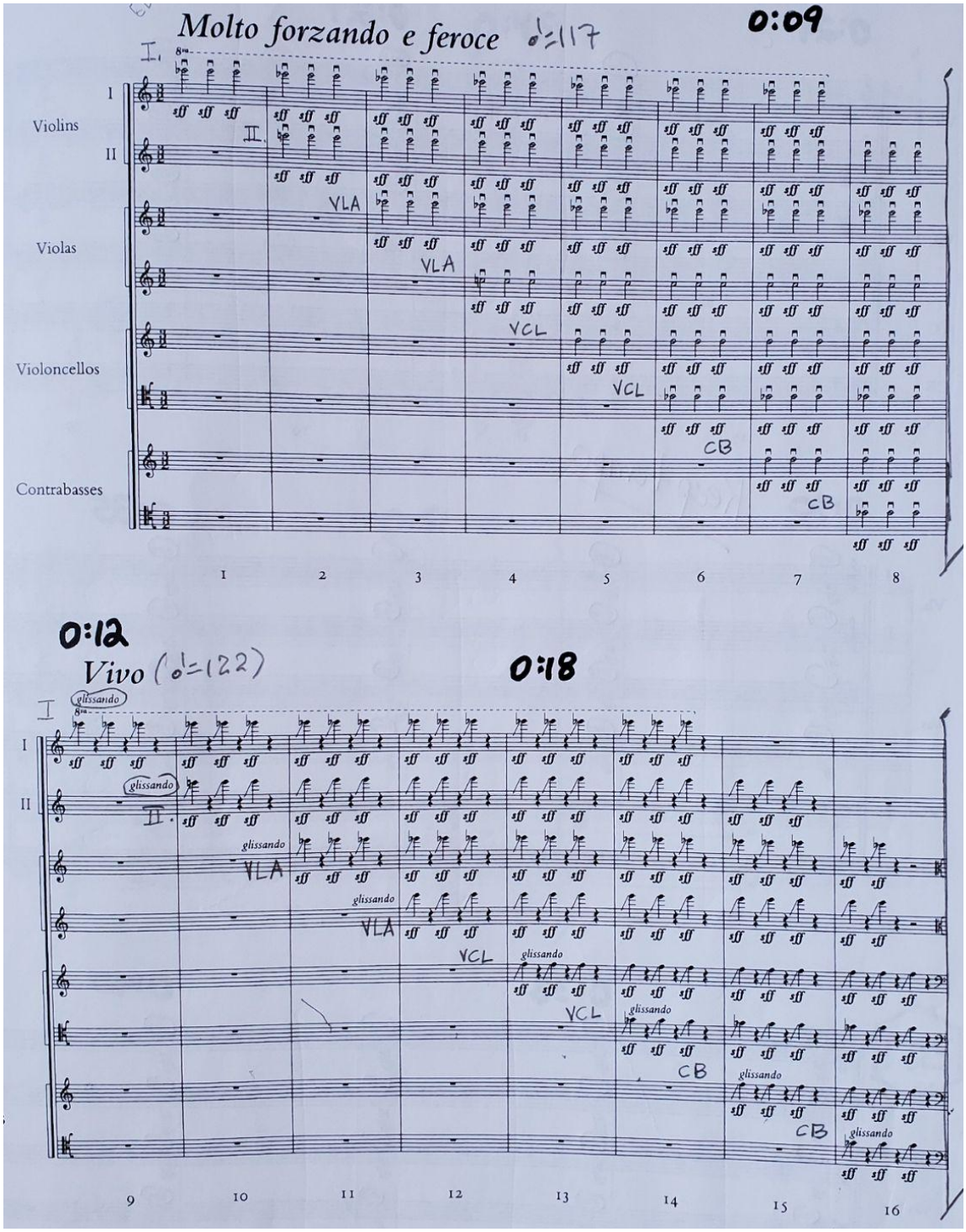

Fig. 3 - Score to 'The Murder' as composed by Bernard Herrmann (1960)

The above figure is the notation for the iconic murder scene of dear Janet Leigh; it is quite remarkable to see the sounds manifested in ink, but there are identifiable techniques and

articulations in here specific to string instrumentation that help understand how these notes jump off the page. The first is the *down-bow*, a common and seemingly innocuous instruction in string repertoire. To down-bow is to play the instrument from the frog of the bow (where the hand holds the stick) to the tip; to *up-bow* is to play the instrument from the tip of the bow to the frog. The down-bow is notated as such:

Fig. 4 - down-bow notation

This notation is seen in the first eight measures of Herrmann's composition for The Murder. Increased control of the bow by nature of the hand's proximity to the instrument inherently gives more weight to the motion of the down-bow, thus allowing for stronger, louder attacks on notes and lending a 'roughness' to the texture of the sound. This is an articulation symbol specific to bowed stringed instruments, which Herrmann then combines with the violin's capability to reach particularly high registers of pitch. The range of the above composition is within three octaves, all above middle C, starting at E-flat 7 in the first violins; however, due to changes in timbre between upper and lower strings, a sense of descending pitch is still generally heard, potentially giving indication of aggression and devolving chaos (Huron et al., 2006). Regardless, the composition remains in a relatively high register, and by combining this with high levels of roughness, the music may occupy a similarly aversive acoustic space as a scream (Trevor et al., 2020). This idea is supported by Leigh's own screams in the shower scene, which happen to be in the same register as the first violins and thus blend in and out with their motion.

The next compositional technique employed particularly well by strings is the *glissando*. The glissando is a run up or down to a certain note that is generally played as smoothly and quickly as possible. It is notated as such:

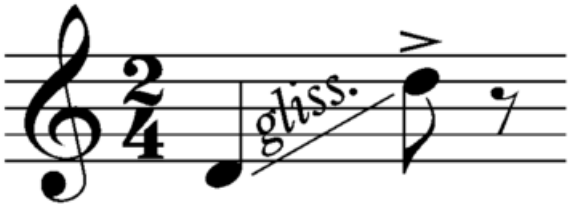

Fig. 5 - Example of a glissando

The glissando is of particular ease for two instrument families: the bowed string-instrument family, and the trombone family. Glissandi *can* be accomplished by other instruments through means of mutes, extended techniques or physically moving the instrument to adjust pitch, but it is most accessible for strings and trombone due to the fact that neither instrument is fretted or buttoned. In other words, there is no measured tuning or pitch system built into the structure of these instruments as there are for woodwinds, keyboards, and brasswinds. As already argued by Herrmann, however, the tone and timbre of the trombone was not within his vision, and the ability to lift the bow off the string while sustaining resonance is important in providing a sense of 'space' without resolution. Writing the glissandi in an upwards motion to reiterate the original pitches gives a sense of panicked movement while also allowing space for rhythmic patterns to find congruence with the motions of Bates' swinging knife, thus emphasizing and applying the aggression felt in the music with the act of the stabbing (as following reasoning by Marshall & Cohen, 1988). In all, the combination of these instrument-specific techniques and timbres allowed for The Murder to become what it is today: iconic.

Halloween

As with *Psycho*, the instrumentation of *Halloween* (1978) was unique and instantaneously iconic, though not necessarily by deliberate choice as *Psycho* was. In fact, *Halloween* was originally created without music altogether, and only when John Carpenter decided he needed more 'spook' did he write it himself (Cooke, 2008, p. 470). The themes themselves are nothing particularly groundbreaking in the compositional sense, often exposing Tonic-Dominant key relations and descending semitones; but it is their very simplicity that makes them so effective. The capacity for synthesizers to create unfamiliar sounds is an advantage in the horror genre, as has been observed by Link (2016) in the Cambridge Companion to Film Music. The basis of this advantage, however, lies in the same psychological arguments regarding aversive sound and emulations of non-musical noises.

An advantage of having varied/novel instrumentation over more singular orchestration is the ability to create highly specific and meaningful associations between isolated musical ideas and narrative/characteristic traits. The best example of this is, of course, the characterization of Michael Myers through clearly synthesized musical motifs. Carpenter's instrumentation for the movie seems limited to synthesizers and regular keyboard, functioning as characteristic and narrative cues, respectively. In other words, the sound of the piano is mostly present in moments of atmospheric development, such as the main theme or heard in panning shots of the neighborhood; while the sound of the synthesizer most often appears in concurrence with Michael Myers. Following Marshall and Cohen's Congruence-Association-Model, it is then reasonable to argue that musical traits of the synthesizer may be applied to the character of Myers. What traits may these be? Donnelly (2010), as cited by Link (2016), argues that it is the "synthetic sonic embodiment of the supernatural, killing machines, which appear to be highly

efficient (perhaps like the machines of the synthesizers)" (p. 203), and this is supported in some fashion by the ways in which Myers seems to appear and disappear from frames like a ghost, cued by the high tinkling of a synthesizer relating A to F-sharp. This association between motive and character then primes the audience through principles of classical conditioning to expect one when they experience the other, causing them to jump when the high notes of the synth are played before even visually registering the presence of Myers.

The use of synthesizers once again allows for the creation of unique and new sounds while having complete control over the entire grand staff and beyond it. With electronic music, one is no longer limited by the tuning or technical capabilities of an instrument; distortion, reverb, texture, and pitch can all be manipulated for maximum effect. Carpenter does this by making use of high and low oscillating tones at moments of fearful tension and serious threat, often simultaneously. Following Huron et al.'s (2006) argument on pitch and perceptions of danger, this may accomplish a concurrent feeling of fear and timidity in the high tones, and boss-level threat in the low tones. Muddied or unclear pitch has also been found to be more associated with increased levels of aggression, which may then be compounded with the coldness and unfamiliarity in the timbre of a synthesizer. Through these instrumental techniques, Carpenter may be single-handedly responsible for the rise in synthetic sound as representative of mechanical evil.

Scream

Beltrami's instrumentation of *Scream* (1996) is by far the most robust of the three exemplar movies, featuring what sounds like a full orchestra *and* electronic music sources. Full orchestration expands the advantages of compositional variability significantly, exploiting different timbres and instrumental techniques to create a lush, encompassing score. As a movie

designed to be a love letter to early slashers like *Psycho* and *Halloween*, larger orchestration also allows for more horror conventions to be referenced and recognized, like the repeated use of high strings and employment of synthesizers. Similar to Carpenter's instrument-character associations, Beltrami seems to employ consistent instrumental combinations to indicate signs of real or fake danger. For example, the presence of piano, particularly high atonal tinkling, becomes a reliable cue for the approach of Ghostface through reasoning of the Congruence-Association-Model. Association of low pitch with aggression (Huron et al., 2006; Ohala, 1984) is also exploited as a narrative clue to who Ghostface is, even in actionless scenes. This is seen, for example, in the DVD store after classes are suspended when Randy yells, "everybody is a suspect!" Billy's appearance behind him is sudden and deliberately scary with employment of loud dynamics and low cluster chords in the piano. However, unlike other scenes in which this scare tactic is used and the menacing music fades, in this scene it lingers. The low cluster chords in the piano continue while a distorted industrial sound floats above and increases in intensity. With the perceptual combination of low, 'rough' pitches and sustained, unidentified, distorted sounds, the audience gets the feeling that something is deeply wrong as the feeling of aggression and threat persists.

Beltrami's lush orchestration was also a deliberate choice that afforded him room to subvert and play with conventions from horror and other genres, adding more weight to the self-referential perspective of the movie. This is seen in score pieces such as Sidney's Lament, which plays upon Sidney's reflection on her dead mother. The piece features a solemn single female voice moving in stepwise motion and supported by strings in the key of e minor, an appropriate structural reflection of contrapuntal rules often followed in laments. However, this conventional basis is then expanded upon with the addition of low cluster chords in the piano and

sympathetic resonances floating throughout; as we watch Sidney mourn, we feel both sadness and a sense of wrongness applied to the scene at hand through deliberate narrative congruence (Marshall & Cohen, 1988). This feeling is pushed further as the piece continues on and becomes more subtly bizarre, with low horns interjecting leading tones against the root note and the rise of a muted trumpet in unison with the solo voice.

Concluding Thoughts

Through the study of *Psycho*, *Halloween*, *Scream*, and others, it is clear that a composer's choice of instrumentation is one that affects the entire tone of a film as well as its musical possibilities. It is particularly interesting that, particularly in the case of the horror genre, extended techniques must often be taken into account when deciding what kind of sound could be possible, and how such possibilities can enable the film to spook its audience in new ways. Given the evident ability for some instruments to elicit more aversive reactions via these avenues, it would be interesting to further study potential positive effects of specific instrumentation.

We have also seen how instrumentation can affect compositional range, potentially affecting the audience's perception of size and/or threat in an applicable scenario. A tuba will always drown out a violin if you ask them to regardless of how furiously the violinist will be trying to keep up; a tuba will also have an easier time playing so loudly if they are playing within a quite low range. Circling back to Neuhoff's (1998) argument regarding pitch-size perception, the instrumental choice of a tuba would more easily signify aggression… So how would it feel if it were to come closer?

Dynamics

Closely related to and often intertwined with instrumentation is dynamics. As aforementioned, *dynamics* in the context of music theory refers to how loud or soft a piece of music is. Colloquially, however, people use the term *dynamics* to refer to both the loudness of a piece and how the piece is marked to play it in the correct manner. In the theoretical context, these 'marks' are referred to as *articulation*. While dynamics are the more psychologically powerful, articulation must be included in our considerations as the two terms are often conflated in a broader context. Dynamics particularly exploit our perceptions of distance: we have learned over time, through multiple iterations of evolution, that the quieter something is, the farther away that thing tends to be; with increasing loudness comes decreased distance, telling our brains that something is approaching, so we better be prepared! This anticipation can actually cause us to overcompensate, expecting the thing to be closer than it actually is and thus preemptively creating expectation. We may then react with discomfort at the period of waiting that we have created for ourselves, and the frustration/arousal at the initially expected outcome that has since become a surprise. This method of building tension and creating surprise is an example of *delay conditioning* as mentioned in the introduction. To briefly revisit, delay conditioning refers to the presentation of a stimulus predictive of a certain outcome and the delayed presentation of the outcome as the original stimulus continues. Horror movies do this often by playing the music associated with the films 'monster' before the monster appears, heralding its appearance and priming the audience to react.

As dynamics are to distance what instrumentation can be to size, the combination of the two can create the impression of a larger present/approaching danger than there actually may be. For example, the increase in dynamics of bass instruments as seen in *1917* (2019) and many

Marvel movies can simulate the feeling and sound of the ground shaking, and the lower register of tone is often perceived proportionately to size, weight, and aggression. The combination of loud dynamics with low tones thus creates the grandiose impression of an approaching larger-than-life threat, be it rolling tanks, invading aliens or the Incredible Hulk. It also provides a level of physical immersion with a scene when an audience in a theater can feel the 'rumble' of bass in their chest, almost as if they were really there.

Another clever example of how dynamics can affect perception is in fact found in *Monty Python and The Holy Grail* (1975) upon the arrival of Lancelot to Swamp Castle. His approach is marked by the rumbling of low timpanis, which as aforementioned are often good cues for 'approaching threats, but *Python* takes this idea and playfully exploits it for comedic effect. Rather than a slow and steady crescendo of sound as Lancelot approaches, the music follows the camera cuts between the knight and the guards of the castle: when Lancelot is in frame, the timpanis are rolling at a full volume; and when the guards are in frame, there's a stark difference in the quieter, quaint medieval tunes from inside the walls. What is so funny about this is the joke that as Lancelot approaches at top speed propelled by loud, driving percussion, everytime the camera cuts back to him he is never closer than he was before. There is no crescendo in the drums, but rather a consistent *forte* roll that pokes fun at the fact that the 'big threat' doesn't ever get close enough. It's a funny move then magnified by its repetition; every time more that the camera cuts back to Lancelot in the same place that he was in the beginning makes the contrast between the music and the action that much sillier. And of course, only once we begin to get used to the pattern does Lancelot suddenly appear at the gates with a loud, raucous fanfare and 'guns ablazing,' still achieving the element of surprise after subverting the more serious trope of 'incoming danger.'

Psychological Principles

Psychologically speaking, horror music uses dynamics to exploit processes of threat perception, as well as *sensitization* and *habituation* to particular stimuli. Sensitization is an important component in how we learn to protect ourselves via startle reactions: most basically, it allows for stronger stimuli to elicit stronger responses, the association of which will prime one to respond to such stimuli in a faster, more reactive manner (Gluck et al., 2020). Habituation, on the other hand, is the opposite process of becoming 'used' to a stimulus to the point where little or no reaction is elicited (Gluck et al., 2020). Horror movies manipulate these processes via the exploitation of the *acoustic startle response*. The acoustic startle response is a defensive reaction that causes us to 'jump' at loud noises before we may even explicitly register their sources; sensitization is what can cause this startle response to persist among repeated instances, and habituation causes the response to decrease over time.

In studies on the acoustic startle response in rats, the interaction between the two processes has been observed as such: habituation causes the latency (reaction time) of a response to increase and amplitude (reaction level) of a response to decrease through repeated instances over time, while sensitization shows continual decreases in latency regardless of reactive amplitude, particularly in response to loud noises (Pilz & Schnitzler, 1996). While habituation generally develops alongside a predictive regularity of stimulus presentation and is stimulus-specific, sensitization develops in contexts of irregularity and unstable expectation, and tends to generalize to similar stimuli (e.g. you don't need to hear the same loud noise to be startled). Thus, sensitization in the context of the acoustic startle response may be characterized as the decreasing of reaction time to the point of automatic attention and reaction to stimuli before our conscious registration of it.

The idea of sensitization levels being relative to loudness is peripherally supported by evidence to suggest that sound levels are important in processes of auditory localization (Blauert, 1997, as cited in Granot & Eitan, 2011). In a 2006 study by Eitan and Granot, a highly significant association between dynamics and distance perception was found, showing that crescendoing musical phrases gave listeners the sense of 'approach' while decrescendoing phrases gave listeners a sense of 'away.' The perception of 'approach' is of particular interest as listeners tend to overestimate the perceived speed of whatever is incoming (Neuhoff, 1998), potentially explained by activation of the amygdala found in response to aural stimuli increasing in loudness (Bach et al., 2007). Furthermore, increases in visual cortex excitability have been observed in positive correlation with increasing loudness (Romei, 2009, as cited in Granot & Eitan, 2011), indicating an implicit attentional increase to increasingly louder sounds. As an important player in the management of emotion, fear, and stress, this amygdalic activation suggests that increasing loudness may trigger an orienting stress response designed to prepare the body for incoming trouble, or at the very least an imminent event.

Following reasoning from these findings, horror movies can use dynamics to scare their audiences by increasing sound levels to simulate incoming danger, using extreme sound levels (*fff or ppp*) to elicit a startle response, or combining dynamics with low pitch levels to create perceptually threatening or 'dangerous' sounds (Ohala, 1982, as cited in Granot & Eitan, 2011). This involves the subversion of expectation and deliberate mistiming of scares through dynamic exploitation. Firstly, by understanding the relationship between loudness and startle responses, composers can identify and reserve particular pitch ranges and sound levels for the express purpose of the 'scare,' allowing associations to be made between certain sound characteristics and fear. Secondly, the audience can be 'clued in' to how close or far the present danger is with

the use of hairpin dynamics and gradual crescendos (as seen in *Jaws*), or surprised to see the monster "right behind you!" after *no* dynamic cue of approaching danger. Thirdly, dynamics can 'fake out' the audience into false senses of security through processes of habituation, or divert their attention to one place to create surprise from another.

How Horror Does It

As discussed above, horror movies use dynamics to sensitize their audience to the idea of potential threat, achieved by exploiting extremes of sound levels to trigger biologically based psychological reactions. This can be achieved, for example, by cueing a particularly loud chord after a prolonged silence to trigger a startle response and sensitize the audience; or using dynamic techniques such as *sforzando*, which is a loud dynamic emphasis on a particular note or phrase immediately followed by a softer dynamic level (e.g. *ff* immediately followed by *mf* on the same note/phrase). As loudness can affect a listener's perception of distance, playing with dynamics can also indicate how 'close' the danger is, thus impacting the level of perceived tension in the scene. This is particularly true because of the previously mentioned note that "listeners overestimate increasing loudness change, as compared to decreasing change of equal intensity" (Neuhoff, 1998); thus, an increase of sound level can alert the brain that something is incoming and the body should prepare. Horror movies can take advantage of this perceptual disposition by 'faking out' an audience with a sudden increase of loudness independent of an accompanying visual cue, or a slow but consistent growth in sound level that can evoke a real sense of 'looming' danger.

A similar effect can be made by using dynamic 'hairpins' in the music to indicate the presence of lurking danger, something circling its prey, stepping back and forward but still getting ever closer. Perhaps the most iconic example of this is the use of dynamics in Spielberg's

Jaws (1975) and Williams' composition of the shark motif. Firstly, the association between a particular musical theme and the idea of 'threat' is developed. In Williams' case, the minor second was a particularly effective choice as an interval already agreed upon in the Western twelve-tone equal-temperamentist canon to produce the most dissonance between two notes. Upon the official iteration of the theme but before the explicit introduction of the shark, the music is quiet and low; with the combination of camera perspective as the shark, the audience feels a real sense of danger lurking just below. How the music dynamically behaves becomes a visceral representation of the shark itself, increasing the speed at which the interval changes as the fish gets closer and taking advantage of hairpin techniques to swell and retreat the level of sound. Following Neuhoff's (1998) argument regarding perceptual loudness:distance relations, this ebbing and flowing of dynamics thus interferes with the audience's understanding of how close the danger really is, allowing for a greater element of surprise.

The use of dynamics is also integral to the success of the classic *jump scare*. Jump scares are so colloquially representative of the horror genre that they have become a convention of sorts; the musical preparation for it has become so formulaic, in fact, that a viewer could feasibly predict the occurrence of a jumpscare if they know what to listen for. This is where the concept of delay conditioning really comes into play with the use of extreme dynamics to build cognitive associations between what the audience hears and what they see. In a classic scary scene, but not exclusive of adventure and sci-fi genres, a jump scare is heralded by a moment of particular and/or noteworthy *stillness* on multiple surfaces of input: the characters go still, the lights black out, or the danger seems to abruptly retreat. Sound has a big role in solidifying this perception, as naturally seen in the silence and 'stillness' of snow; even further, music can turn those moments of quiet into moments of excitatory terror as you brace yourself for all hell to break

loose. By filling these moments with music that is particularly suspenseful in character or thematically associated with danger, an expectation of fright is quickly established and the audience primes to react. By drawing this moment out, however, our sense of timing begins to slip as we peek through our hands saying "it's gonna be now, it's gonna be now!" Involving dynamics in this process and playing a particularly loud noise/chord at the same moment as the scare can heighten our startle responses, thus further sensitizing us to potential scares in quieter moments. This is seen in *many* modern popular horror movies, including but certainly not limited to *The Conjuring* (2013), *Insidious* (2010), and *Sinister* (2012), all of which incorporate music and dynamics into their scares to make them all the more terrifying. Other genres such as sci-fi and adventure also tend to use these techniques to startle their audiences if the setting calls for so.

Psycho

Upon looking at the 'Black Book' for *Psycho*, one can see that it is programmatically composed; that is, each piece of music is composed and timed precisely to match specific events happening on-screen. Following programmatic structures typical of late 18th-century, almost all recognizable themes in these pieces are derived from the Prelude/The City, which functionally behaves like an overture. The utilization of dynamics in *Psycho* (1960) is markedly deliberate to differentiate thematic material while maintaining a sense of implicit coherency. Though sound mastering technology of the time combined with digital compression to modern sound systems renders the movie's dynamic contrast as somewhat less extreme than how the original composition is notated, this does not discount the value of marked dynamics seen in the score itself, as changes in dynamics have also been observed to interact with perceived changes in timbre and pitch (Eitan & Granot, 2006). Thus, subtler dynamic changes that are lost in the

mastering of the film may still elicit their intended effects. *Psycho* (1960) again distinguishes itself from its contemporary canon through Herrmann's general use of dynamics as abstractly characteristic, underscoring emotions and actions rather than dialogue. In this context, codification of dynamics is possible in determining that soft dynamics often accompany scenes of sneakiness and conspiracy, while louder dynamics are used to emphasize action, facilitating the application of the music's meaning to the active agent on screen.

The use of dynamics to emphasize action and movement more than dialogue allows for the principles of Marshall and Cohen's Congruence-Association-Model (1988) to take a front seat in piecing together the many sensory surfaces of the film and create the *working narrative*. This is done throughout the film, but a particularly good example is the use of music to underscore Marion's flight from the city. As aforementioned, the musical underscoring of dialogue in the movie is particularly rare, and all pieces are deliberately timed and applied; so it is of importance that Marion's flight is accompanied. The music is taken from the beginning motive in the upper strings in The Prelude/The City, an already fast and frantic theme that palindromically relates m2 and M3 intervals; in other words, the motive dancing from F-A-G#-E outlines a M3-m2-M3 interval pattern, the same relations going forward as they are backward. Herrmann makes this choice regarding intervallic symmetry quite often throughout the film, perhaps to imply a sense of pathological obsession written into the music itself.

Circling back to Marion's flight, the choice to include this motive as accompaniment to Marion's flight allows the music to blend not only with the action of the film but also become applied to the character of Marion. As she drives, imagining what her boss and coworkers might say, the piece continues at a low dynamic so as not to distract the audience from the dialogue… and it continues, and continues, just as Marion's ruminations do. In this particular context, the

CAM can be applied as such: the continuation of the music alongside the verbal stimuli presented in-scene leads the audience to process the two sensory inputs *together* and draw one contextualized understanding of *how* Marion is feeling and what it means for the rest of the film. This enforces the association of the music, which is already complicated and frantic in nature, to the idea of the neuroticism and paranoia that Marion displays. This would not be effective if the music were too loud and overpowered the dialogue, or too quiet to hold enough attentional weight to influence our understanding. This is generally how Herrmann uses dynamics through the film, with careful decisions made as to *what* particular expressions and actions are narratively emphasized through dynamic emphasis (often seen in musical characterizations of Norman).

Halloween

Dynamics are highly contrasted in *Halloween* (1978), often used to raise tension and sensitize the audience to potentially scary stimuli and then subvert their expectations, scaring them more. Most, if not all, 'scary cues' are instrumentally specific to the synthesizer, as previously mentioned, and the consistent use of high frequencies with loud dynamics in its cues sensitizes the audience to its appearance. This allows for innocuous details and actions, like turning on a light, to become potentially scary and intense. This happens a lot in the first 'act' of the film and the subtle movements of the neighborhood. Already primed with the *a priori* expectation to be scared, each predictive and startling cue combined with harmless stimuli increasingly allows the audience to relate with Lee Curtis' portrayal of paranoia and jumpiness. Due to Marshall and Cohen's Congruence Association Model, the matching of these cues – despite being 'harmless' – to Lee Curtis' suspicion prevents habituation from occurring as we still connect these typically safe actions with her feeling of unease. This allows for the same cue to be employed multiple times to increasing effect, only serving to raise the tension in the scene

as the audience begins to lose their sense of expectation regarding where the real danger is. This is a brilliant strategy to sensitize an audience to a particular dynamic cue so that its appearance is reliably effective in eliciting a reaction, then compounded when the cue finally *does* sound at the appearance of Michael Myers, confirming the audience's expectations of present danger while providing no comfort in such confirmation.

Use of dynamics in *Halloween* also serves as a vehicle of characterization, particularly in relation to Michael Myers. It has already been established that Carpenter's choice of instrumentation boosted the synthesizer as a representation of "supernatural, killing machines" (Link, 2016, p. 203), a characterization then applied to the apparently unstoppable Myers as the synthesizer became congruently indicative of his presence. Dynamics help in this characterization through status of consistency: the loudness of the scary synth cue, as above discussed, already sensitizes the audience, but the lack of dynamic difference upon the actual appearance and movement of Myers solidifies this deeper characteristic connection. This is most clearly shown in the climactic scene of the film, when Myers is actively pursuing Laurie around the house. A simple but effective motive is repeated by a quarter note and two sixteenth notes on a low F2-F3 octave, beginning at *forte* and only increasing in sound level: following Granot and Eitan (2011)'s arguments, this can only serve to increase tension in the scene as a sign of incoming danger. Even further, the lack of decreasing sound levels in congruence with Myers' actions applies characteristic meaning to Myers as a literally incessant, dangerous, and unstoppable killing machine. This is corroborated by how this scene also interacts with silence in moments of apparent victory for Laurie only to abruptly return to the ostinato when Myers inevitably rises again, giving the audience a sense that Myers is either literally 'on' or 'off.' This

is repeated multiple times to the same effect, due to both the lack of melody, pitch register, and loudness of the associated motive.

Scream

Dynamics are used heavily in *Scream* (1996) for the purpose of misdirection and subversion of conventional horror expectations. As a meta-referential movie, Beltrami's composition is most cognitively interactive of the three exemplar films in this context, explicitly targeting listeners' perceptual judgments of loudness of distance and potential threat. This is seen in pieces congruent to action-packed scenes with how dynamics move interactively with the characters, specifically Ghostface; these details tend to be *so* congruent that their effects may be more implicit than explicit, but deliberate nonetheless. Firstly, the concept of misdirection follows the reasoning and argument of Boltz (2001) that viewers' attention can be deliberately influenced to notice things more congruent to the working narrative they have developed in their head, partially founded on the score. Indeed, *Scream* effectively shows this idea via manipulation of dynamics to alert the audience of a danger that is actually not there. A short yet extremely effective example of this is in the first 'act' of the movie in Sidney's house during the daytime. Without accompanying music, the camera depicts nothing more than a teenage girl doing household chores; *with* music, however, her actions begin to have weight and feel consequential. This is most heavily enforced when Sidney walks down the stairs and opens the front hall closet door. Her regular movements are only underscored by low, industrial-like ambience with quiet bells, indicating a looming sense of foreboding. Upon the opening of the closet door, however, the sound quickly rises in amplitude while falling in pitch; following Ohala and Granot and Eitan's findings, this would give the audience a sudden sense of approaching danger, and it effectively does. Upon this dynamic cue the audience becomes alert at nearby

danger, only compounded by the obstruction of view by the closet door. It is a classic moment of 'he's going to be right there!' only to abruptly drop again in dynamic level and reveal… nothing out of the ordinary, setting the audience into a deeper feeling of unease. This particular fake-out is so effective that I find myself rewinding to catch the motion again, sure that there *is* a dangerous detail that I haven't noticed, and I'm surprised every time there is none to be found.

Dynamics also serve as a literal indicator for how close the danger (a.k.a. Ghostface) is to the victim of the scene. This is heard in Ghostface's many attacks upon Sidney, but let's take a look at the first as an example. It is revealed that Sidney has unwittingly locked herself in the house with Ghostface as he emerges from the very same closet that falsely spooked the audience earlier in the film. Upon his appearance, dynamics explode with loud horns in an irregular rhythmic ostinato punctuating his hacks and slashes. The pitch and sound level rises with their ascent up the stairs as he *almost*, *almost*, but not quite catches her, giving the audience a real sense of relief when Sidney manages to close her bedroom door and 'block' the killer and his associated music, off-putting its dynamic 'arrival' that could only accompany her demise. The dynamics increase again as he tries to get through, slashing through the air, motivating the audience to root Sidney on and avoid that dynamic arrival. In this sense, Beltrami connects Granot and Eitan's arguments of dynamics and tension to a literal representation of the concept as shown through dynamic interaction of the music with the actions of Ghostface.

Concluding Thoughts

As seen in the above movies, dynamics are most effective in helping the audience to build a spatial understanding, grounding themselves literally and metaphorically in the narrative. In horror, this perception can be exploited by either refusing to provide such spatial information through dynamics, or luring the audience into mistakenly believing that 'something is behind the

door!' when there isn't. Even beyond horror, though, it is evident how dynamics are integral in providing the audience with accurate information regarding a scene's space, as well as clues to what is really important in a scene. As previously discussed, louder things are simply more likely to be attended to by virtue of being easier to hear; thus, a composer or sound designer's choice of sound level is important in the audience's understanding of what is important to the present events.

Following this line of reasoning, it would be interesting to further study a potential dynamic threshold of aural attention: in other words, is there a certain decibel/frequency level of sound that must be surpassed to hold more attentional weight and/or be more easily accessible? Furthermore, does simply *loud* or *soft* music have the potential to hold certain narrative power? How would this be determined? How *could* this be determined? What would it mean?

Enter diegesis.

Diegesis

Diegesis refers to the 'source' of music from within a film's universe or out of it. A piece or a song is considered diegetic if it exists as a tangible thing within the confines of the screen that the characters can hear as well as the audience; on the other hand, if it exists as an accompaniment or underscore to a scene in which the characters cannot hear it but the audience can, it is non-diegetic. Diegesis is an important component of psychological power as it can change how we process music as related to the movie and how we apply interpretations to the working narrative: according to the Congruence-Association-Model (CAM), "some information arising from one aspect can take part in the diegesis while other information of the music can be ignored" (Cohen, 2014, p. 121). In other words, the interaction of characters with diegetic music, or their reactions to it, can emphasize certain structural accents that would otherwise go unnoticed.

Along these same lines, diegesis can give characters a level of narrative agency, just as our own daily soundtracks can impact the kind of day we have. This is seen most poignantly in Edgar Wright's *Baby Driver* (2017), the soundtrack for which is almost solely controlled by the film's titular character, Baby. Baby's control over the music, and extended control over the film, is seen within the first fifteen minutes of screen-time, exemplified in a stroll to get some coffee. In this scene alone, the audience understands how the role of diegetic music is incredibly important in understanding the character of Baby, the world he lives in, and the actions he takes within it: signs and posters seem to sing along to the lyrics of "Harlem Shuffle" as originally sung by Bob & Earl in 1963 as Baby grooves down the street, stalling conversations and causing traffic in order to stay in time with the music. As the audience watches him it becomes quickly clear that music is his life-force, allowing him the ability to live life while having significant

power over how he does so. This affords both the music and the character a significant amount of narrative agency, and allows for incredibly cool moments of intentional synchronicity that can become particularly memorable to the viewer as important both characteristically and narratively.

Psychological Principles

Psychologically speaking, diegesis can influence interpretations of the audience on a movie through the manipulation of attentional weight to apply different meanings to associated characters, relationships, objects, and settings. The CAM argues that due to selectivity of attention, a piece of music doesn't necessarily have to be diegetic or non-diegetic in order to have an interpretable effect (Marshall & Cohen, 1988); however, Tan, Spackman and Wakefield (2017) noted an interaction between loudness and diegetic perception in that sound level can act as a cue to whether a piece or song is playing in the 'foreground' or 'background' of the film. This is often employed when in-movie songs can 'fade' from non-diegetic to diegetic via sound level manipulation and mastering to sound 'thinner' or 'fuller' as the camera pans to a pair of headphones or a boombox, for example. This difference was then observed to influence viewers' ultimate understanding of the film's working narrative as well as its characters and their relationships & motivations. As previously discussed, attention is given more easily to things that are more accessible to process (Gluck et al., 2020); therefore, a louder sound is simply going to have a higher likelihood of holding one's attention than a simultaneous but softer tone. However, that is not to say that the softer sound does not still have important and useful information, as discussed later regarding Carpenter's dynamic use of diegesis *Halloween* (1978). It is thus easy to understand the inherent interaction between dynamics and diegesis.

So *how* can attentional weight then change viewers' experiences? Circling back to Tan et al.'s (2017) study, they found that manipulating the perceived diegetic status of movie music (i.e.

putting it in the 'foreground' or 'background') changed viewers' interpretations of a scene from *Minority Report* regarding the characters and perceived tension. This was accomplished using a chase scene set in a mall with three different conditions: original non-congruent diegetic soundtrack ('Moon River' as originally composed and recorded by Henry Mancini, playing on the mall loudspeakers); original non-congruent non-diegetic soundtrack ('Moon River' manipulated to sound non-diegetic, unheard by the characters); and non-original, congruent diegetic soundtrack (a 'chase music' excerpt from Spielberg's *Empire of the Sun*, unheard by the characters). Between these conditions, Tan et al. (2017) found significant differences in scene interpretation that came down to status of diegesis rather than congruence: for example, participant scene interpretations were generally similar between both non-diegetic music conditions regardless of congruency. 'Chase' music was marginally more effective in expressing tension than non-diegetic 'Moon River' which was more effective in expressing less aggressive, more romantic undertones between the two main characters; but original diegetic 'Moon River' was significantly *most* effective in expressing tension and aggression as they moved through the mall (Tan et al., 2017).

Although the authors determined differences on diegetic rather than congruent dimensions, the reasoning for this may indeed come down to the congruence — or lack thereof — of the music to the scene. Tan argues that "the gentle ballad music sustains the level of tension of this suspenseful scene if presented as if it could be incidental music playing in the background," related to the idea that certain forms of diegetic music may serve to make a scene more or less believable based on how its associated meaning can be applied to the scene. This is where ironic contrast can be used to a film's advantage, such as when a calm, antiquated (A.K.A. original) rendition of 'Moon River' accompanies a high-stakes chase: ''By taking music meant

as extra-narrative comment and rendering it diegetic ... the narration motivates, naturalizes the music, makes its disparity with the filmed events acceptable'' (Gorbman, 1987, as cited in Tan et al., 2017, p. 618). This is supported by Powell (2016), who argues that the inability to ascribe music to a 'real' source on-screen forces the audience to focus on "its emotional content, which we then superimpose onto the visual action" (pp. 106). By extension of that reasoning, the presence of a source for the occurring music may serve to limit our emotional associations by realizing it rather than letting it remain abstract: the subversion of associated musical meaning serves to contrast against the actions and intentions of the characters, but the diegetic status of the music protects the audience from *applying* said meaning to the characters, as seen in the non-diegetic 'Moon River' condition of Tan et al.'s study. Based on their findings, the diegetic status of music may serve to modulate the application of meaning to a scene, particularly in regards to characters, their relationships, and the intended undertones of the scene.

A brilliant example of the power of diegesis can be found in the *Pirates of the Caribbean* franchise with the music of Davy Jones' Locket. The melody is first introduced during the second movie of the franchise as the non-diegetic theme of Jones and the Flying Dutchman. It is heavy and foreboding, perfectly reflecting the methods of Jones and the wretched circumstances of the crew; it appears again diegetically by Jones' pipe organ in the same fashion. Upon its *original* iteration as heard diegetically through Jones' locket, however, the audience learns that the angry and aggressive music associated with Jones is in fact a variation on a theme originally heard in a sweet, simple music-box tune. It is later revealed that Calypso (AKA Tia Dalma), the long lost love of Jones, wears a matching locket, presumably carrying the same song, and it becomes clear that the Davy Jones theme — the representation of his personality and beliefs —

is in fact rooted in the love that he and Calypso shared, and the love that went wrong. The most compelling use of this theme is perhaps in the final movie of the original trilogy, when Jones visits Calypso in the brig of a ship. The audience finally receives confirmation that her own locket's tune is Jones' theme as she sits looking at the music box before closing it mid-phrase. The audience is not left disappointed, however, as a second, off-screen music box begins to play where the first stopped… and they know Davy Jones has arrived. The melody continues playing as the two converse, and again is closed before reaching a satisfying resolution. However, when Calypso puts her hand on Jones' heart, temporarily transforming him back into a man, the melody returns non-diegetically with low strings and low chorus, haunting and sad.

Circling back to Tan, Spackman, and Wakefield's argument, the switch of the music's diegetic status at this point allows the audience to re-evaluate the meaning of Jones' melody not only as something he holds on to but also something that lives deep within him and moves his soul. This re-evaluation makes his final statement, "my heart will always belong to you," that much more meaningful, as the music reframes the audience's perspective of the character as a human being mourning the past, unable to let go, while simultaneously representing the lost relationship that so plagues him. If one listens, whenever the locket plays that sweet tune, it always stops just before reaching the resolving tonic note, a frustrating cliffhanger for any listener; it is unfinished and unsatisfied, melancholically mirroring the lost love between Calypso and Jones. Tan et al. (2017) describe the distinction between diegetic and non-diegetic music as the difference between "a suggested or implied, rather than actual, source" in the movie, whether the music in a scene has an identifiable source within the environment of the characters. As aforementioned in *Pirates of the Caribbean*, this attentional distinction can then influence the

audience's application of the music's meaning as innate and unknown to the character… or a deliberate choice of representation consciously made by the character.

How Horror Does It

Horror movies exploit the function of diegesis by blurring the potential 'source' of music in a scene, calling into question what is 'music' vs 'sound,' and what is real vs imagined. The historical unconventionality of horror scores allows for easier opportunity to blur these lines, as compositional techniques and musical innovations in the 20th century were already experimental in their employment of 'non-musical' sounds and percussion such as sirens (e.g. Edgard Varèse, *Amériques* (1918-1921)). Following this detail, instrumentation holds an interaction with the diegetic component of horror music, as percussive techniques can blur the lines between identifiable 'music' with the sounds of slamming doors, phantom knocks, and claps from across an empty house.

A great example of this is found in *The Conjuring*'s (2013) use of phantom sounds in an empty house, as well as deliberate diegetic interactions with musical instruments and sounds. The 'Hide and Clap' scene, for example, mixes sound with music through the percussive noise of a (you guessed it) clap. For one, it is an interesting note of how we may differentiate music from sound by something as simple as rhythm (or a lack thereof). For another, it inserts the idea of musical presence in and of itself as a sign of danger. This is further supported by the diegetic use of a piano in the scene, calling the attention of Carolyn to the basement with tones of A-flat 2, E2, and D2 about a quarter tone flat. Not only is the phantom playing of an old piano simply creepy, but the instrument's involvement in the scene goes further when Carolyn is pushed down the stairs and happens to land on the piano, causing a resounding and uncomfortably low cluster chord to echo as the audience startles. Not only can we see the fall, we *hear* the fall she takes,

bringing us one sense closer to *feeling* the fall she takes, thus allowing us to more viscerally register the danger she's in. It is indeed another example of a jump scare, thus interacting with dynamics as well; nonetheless, the inclusion of musical sounds in the atmosphere of the terrifying or threatening seems to weaponize them in some form as something that can reach out and interact with the characters.

Psycho

As with many domains, the role of diegesis in *Psycho* (1960) is contemporaneously unique: that is, there is no diegetic music. This is not surprising given Herrmann's views on musical authenticity and credit, as previously noted in the 'Instrumentation' chapter. To revisit, Herrmann was adamant about having personal control over the compositional process, believing that to have another person orchestrate your own composition would "be like someone putting color to your paintings" (Cooke, 2008, p. 206). Indeed, this opinion was *not* limited to orchestration, and he stood his ground even when the world started to change around him.

> A large percentage of producers today are so unaware of their pictures they're looking for a musical gimmick to lure the public. Like the hit title tune, a harmonica surrounded by a choral group, the twanging sound of an electric zither, or the wail of a kazoo in an espresso café, Stuff like that. It only takes away from what is happening on the screen. (*The Hollywood Reporter*, 1964, as cited in Cooke, 2008, p. 396)

Evidently, Herrmann had no patience for the concept of 'external' musical input: whatever needed to be conveyed had to come from *him* and no one else, for fear that it would detract from the intended experience. Diegesis, as a popular vehicle for 'external' music to join a soundtrack,

most likely fit under this description; even looking away from 'popular' songs, if the scene or movie isn't *about* music, its diegetic use is not necessary.

If we push past these potential 'whys' and 'why nots', there is an important question to consider: where *could* diegetic music function effectively in the film? Perhaps in the car when Marion is fleeing, although a panicked and paranoid woman probably *wouldn't* turn up the volume; or maybe back in Norman's parlor when he and Marion are having conversation, but then Herrmann's own 'Madhouse' composition wouldn't be so effective, and Bates perhaps wouldn't seem *so* strange. This question may serve to further explain the choice to omit diegetic music beyond Herrmann's own beliefs; wherever one may consider the possibility of diegetic music in *Psycho*, it never seems to make narrative sense.

Psycho is a good reminder that although diegetic status can influence the audience's interpretations, it is not necessary in order to make a good film. That is, with a strong enough composition, a fully non-diegetic score such as Herrmann's can uphold the experience of the movie perfectly well. This comes down, as aforementioned, to the exact timing of the music to the screen: audiences may not realize it, but live orchestra accompaniments to the film are marked with time intervals so that the orchestra reaches the downbeat of measure nine at 0:12 seconds and measure thirteen at 0:14 seconds, for example (see Fig. 3). In other words, it is *exact*. This exactness allows for deliberate congruences to occur between the music and film at particularly important scenes; as per Marshall and Cohen's (1988) CAM model, this facilitates the top-down application of associated meaning from the music to the scene at hand. This is shown many times in subtle ways, such as the rhythmic matching of windshield wipers to the quarter note of 'The Rainstorm' that cements the feeling of chaotic panic; or the movement of Norman Bates matching the pizzicato in the upper strings as Detective Arbogast drives away.

The way that his movements follow musical gestures, almost as if he can hear them, subtly confirms to the audience that Bates is aware of something that the others do not know. Although there is no diegetic music used, *Psycho* does well to match the music with action, providing many examples of how the CAM can work in real time without the audience's explicit awareness.

Halloween

Musical diegesis is employed one time in *Halloween* (1978), using Blue Öyster Cult's "Don't Fear the Reaper" to very clever narrative effect. The song is heard 'incidentally' through a car radio as Laurie and Annie drive around their neighborhood smoking a joint. As they have their conversation about boys and high school and Halloween, the opening riff of 'The Reaper' plays, familiar to the audience as a fairly new song released in Summer of 1976. However, the entrance of the lyrics, "all our times have come, here but now they're gone," is withheld until Michael Myers turns onto their same street and trails behind them, quite literally cuing in the Grim Reaper and signaling the inevitability of death following Laurie and Annie. The choice of diegetic status for this song is of important note, following Tan et al.'s (2017) arguments regarding believability of context-specific music: the appearance of The Cult's song as non-diegetic would have been too 'on-the-nose' to be effective as subtle foreshadowing, eliciting an eye-roll rather than an excitatory reaction at noticing an 'easter egg.' The 'incidence' of the song through the car speaker can further serve as a buffer between the song's meaning and interpretation of the characters, so that associated meaning of the 'Reaper's' Identity is not ascribed *to* them, but rather something that will *happen* to them. Furthermore, the non-diegetic status of the song would be stylistically different from the rest of the original score, disrupting

the feeling of neighborhood spookiness that Carpenter's high keyboard and synth motives achieve.

Scream

Of the three exemplar movies, *Scream* (1996) again utilizes diegesis with the most frequency and intention, using diegesis to provide temporal and local context as well as metareferences to past slasher films, including both *Psycho* (1960) and *Halloween* (1978). Having officially entered the era of the 'curated' soundtrack, the use of popular and recognizable songs had surpassed the limits of diegesis, now found in title sequences and transitory shots. This expansion allows us to see how popular songs can narratively function in a soundtrack, and how their associated meanings can be applied in different diegetic contexts.

One great example of how diegetic status can change applied meaning in *Scream* (1996) is in fact seen again in their own use of Blue Öyster Cult's "Don't Fear the Reaper," in this case performed by Gus Black in a soft acoustic arrangement. Change of instrumentation notwithstanding, the biggest difference between the use of this song from *Halloween* to *Scream* is its functional application of associated meaning to different scenes via active diegetic manipulation. Like *Halloween*, *Scream* employs "The Reaper" diegetically — however, the detail that Billy is the one to turn the music on is an important one. As aforementioned, a level of agency is afforded to Billy as he chooses the present soundtrack, which is then extended through sound mastering to bring the song up to 'non-diegetic' status as heard through richer timbre and fuller tone (noted around the line "Baby I'm your man"). This attention to detail allows for the music to hold a dual effect by initially tying the song and its source directly to Billy, only for its meaning to become abstracted onto the overall scene through manipulation of diegetic status. This argument follows Powell's (2016) reasoning that lack — or perhaps

ambiguity — of sound source can facilitate abstraction of meaning onto the scene. The choice of this song thus becomes very interesting given the context in which it plays: an intimate scene between Billy and Sidney.

To those familiar with the movie, the associated meaning of the song along with the title line itself, 'don't fear the reaper,' acts like a bright neon sign outlining exactly what is happening on-screen: The 'Reaper' quite literally telling our main character, "don't be afraid." Others have noted that it may have been a deliberate move to distract Sidney (and by extension, audience) while Billy's accomplice Stu attacks Sidney's father. To those unfamiliar with the movie, however, the incongruence of the song's associated meaning — death — with the scene's apparent meaning — love, romance, and intimacy — may allow for the scene to be more easily recalled in reviewing what matters about the movie. This is supported by rationale from Boltz's (2001) study which argued that music can guide attention to notice and take meaning from certain details, and her suggestion that music meaningfully incongruent to the film may be better remembered by 'sticking out' from the typical soundscape. As opposed to *Halloween*, the developed lack of musical source for this song may also allow for meaning to be characteristically applied, tying the inevitability of death and ideas of 'dancing with the devil' found in the song's lyrics to Billy and Sidney's relationship. It can make for a great experience of 'eureka' for first-time viewers as they review the movie post-hoc and connect the dots.

Another memorable manipulation of diegesis is *Scream*'s in-film use of Carpenter's own score for *Halloween*, a form of ultimate homage to the genre-builder accomplished by the inclusion of the iconic film in the 1996 movie. Despite occasional transpositions up a half-step, the music is immediately recognizable as Carpenter's thanks to its unique instrumentation, tying *Scream*'s climactic scene directly to the conventions drawn by *Halloween*'s own 'Final Girl

Finale.' Its diegetic inclusion allows for iconic soundbites — Myers' synth cues, or Lee Curtis' screams, for example — to be isolated and manipulated to the context of 1996 Woodsboro rather than 1978 Illinois. Although there is an identifiable source of the related sounds, their cues intermingle with the movement of the 'real' characters in *Scream* instead of those in *Halloween*, effectively blurring the lines of diegesis and recognizing the narrative power that Carpenter's music holds. Furthermore, the movie-within-a-movie dichotomy exploited by the film allows for the congruence of Myers' associated shock cues with Ghostface's actions to serve as a playful yet deliberate reminder of musical power, revitalizing a simple synth cue to give that familiar fright.

Concluding Thoughts

As with the prior components, the observation of diegetic function in horror movies illuminates the potential that it holds to affect the viewer's experience. An interesting point is, unlike overt dynamic extremes and orchestrational anomalies, diegesis tends to be used more subtly in horror as an 'easter egg' of sorts for those who are detail-oriented or like to give things re-watches. This is seen in both *Halloween* (1978) and *Scream* (1996) in their uses of "(Don't Fear) The Reaper," originally by Blue Öyster Cult, as clever nods to the danger lurking as Laurie and Annie drive around their neighborhood, or the irony of Sidney and Billy's "PG-13" moment. Through observation of different genres, however, one can see how diegesis can be used explicitly and still to great effect, affording the film's characters a level of agency and adding an extra layer of narrative meaning to the scene.

Silence

For the purposes of this paper, 'silence' is considered to be the marked absence of musical sound to allow for non-musical diegetic sound to be heard. It is necessary to distinguish silence from dynamics as they not only function differently in music but also target different perceptive responses in the viewer altogether. While dynamics can indicate a sense of motion and distance, silence accomplishes the opposite: it can stop a plot in its tracks and steal the air from a room, important enough to be identified as a thing of itself rather than an absence of something else. To better understand this, it is important to know the implications of silence in and out of musical contexts, as it has been historically addressed more primarily in philosophical, rather than scientific, spheres of thought.

The concept of silence as representative of stillness, reflection, spirituality, and 'peace' has long been philosophically and religiously attended, as seen in monastic silences for centuries (Ochoa Gautier, 2015). Furthermore, the effects of 'silence' (defined as a sound below 20 dBs) have also been psychologically observed as calming and appropriate for therapeutic settings (Pfeifer & Wittmann, 2020). On the other hand, there is a concurrent agreement regarding silence as characteristically 'sinister,' which "invokes a haunting; the dangers and fear of the unknown; the insecurities produced by the ungraspable and by the profound irreversibility of death" (Toop, 2010, as cited by Ochoa Gautier, p. 183). Noting this argument, we can then draw the idea of silence back to historical influences on 'scary music' as representations of the bizarre, esoteric, and unknown. Combining this with silence's inter-cultural association with *calm*, composers for horror scores can use silence as a functional tool in building and subverting expectations.

Musically speaking, ‘silence’ has been important since the beginning, but not critically considered until John Cage’s (in)famous 4’33”, in which he ‘performs’ a piece on the piano that calls for no notes to be played. The piece premiered in Woodstock, NY, in a concert hall surrounded by nature to reflect Cage’s belief that silence does not in fact exist (Ochoa Gautier, 2015), and that the sounds heard throughout those 4 minutes and 33 seconds *are* the music. It is important to note that due to the proximity of the concert hall to the forest, the ‘sounds’ heard were those of the wind and the birds in the trees, sounds of nature and ambient life. Thus, my professor who was interrupted by a pizza man when listening to a performance of the piece arguably listened to pizza-man music. Nowadays, performances of this piece often take place in closed concert halls that are deliberately soundproofed, and so the modern experience of the piece — hearing literally nothing in a very formalized setting — is generally not Cage’s intention. Nonetheless, Cage’s composition was incredibly important in the musical world’s consideration of ‘silence’ as a thing in and of itself, rather than the absence of something else. Indeed, while this paper refers to ‘silence’ as the marked absence of music, that does not mean that the silence is not filled with something else. As aforementioned, ‘silence’ as we perceptually ‘hear’ it is any sound under 20 dBs, which implies that there is still auditory activity happening that we simply aren’t cognizant of; thus, it is generally agreed upon that “total silence is a physical impossibility even when viewing static objects” (Cooke, 2008, p. 3). Film also recognizes this, filling moments of ‘silence’ with field recordings of ‘room tone’ so that a physical sense of space is still felt. Otherwise, the audience may think that the speakers have malfunctioned (Cooke, 2008). Therefore, ‘silences’ in film are rarely ever truly *silent*, but filmmakers can get damn near close.

Psychological Principles

Based on its multitude of definitions and general debate regarding what silence *is* or *isn't*, it is of a certain difficulty to make valid psychological observations, and so this particular chapter is less robust in its scientific sourcing compared the other mentioned musical components. However, although *silence* as a concept is hard to empirically quantify, we can still look at how listeners typically use auditory cues to build an understanding of their spatial environment, and what could happen if such cues are not present. It has already been established that we use auditory cues to help us build a spatial understanding of the environment and potential threats in our vicinity (Bach, 2007; Eitan & Granot, 2006; Granot & Eitan, 2011). We have seen how dynamics can take advantage of this effect to subvert expectations by 'faking' the audience out into believing in an unreal danger (e.g. *Scream*); so what about opposite processes to lure a viewer into false security? Interestingly, Granot and Eitan (2011) found that listeners attentively react to increasing changes in loudness, but *not* decreasing changes of similar intensity; so although one may think simply decreasing volume may elicit a feeling of security, it wouldn't be effective in subverting one's expectations to scare them. Instead, it may be more uncomfortable for viewers to have no point of aural reference at all, no sense of motion through sound to build an understanding of one's space. This discomfort then makes sense as a reaction to a form of sensory deprivation, effectively blocking an important source of information through which we build our perceptions.

Silence in the context of film music is also of particular interest in regards to how perceptual lines can blur between music and sound within the scene. In this context silence and dynamics interact heavily, as a piece can go so quiet in noise level that we may not perceptually

differentiate it from the non-musical sounds in a scene. This is often done with the use of drones and industrial noise, as seen in the work of David Lynch. Lynch, with his composing accomplice Angelo Badalamenti, is largely known as a master of sound design who prefers to walk the "borderline between sound effects and music" (Cooke, 2008, p. 486) as a reflection of his interested vision in evil and the perverse. This is seen globally in *Twin Peaks* (1990) via Lynch's use of electronic sources to produce certain pitches without musical cues over a low hum that can be easily mixed with sounds of a cityscape. The effect is disorienting to the viewer, but over time became a welcome hallmark of perceptual dissonance in Lynch's work. Although silence is not actually present, the compositional employment of unfamiliar and inhuman sounds can act as a sort of musical silence as the perceived sounds of the movie then 'speak for themselves.' This is why it is important to recognize the idea of silence as an exploitable function when in the context of music, and how one's perception of 'silence' in a particular scenario is relative to other concurrent sensory inputs: Lynch has a particular talent in exploiting these relativities to cause the audience not only to hear silence, but to *feel* it, even when there is still something else to be heard.

A good narrative example of musical silence is found in *Lord of the Rings: The Fellowship of the Ring* (2001) in the Mines of Moria when the Orcs and Cave Troll attack. They are precursed by 'drums in the deep,' building tension and recognition of an approaching threat, but there is a noted lack of music upon the enemies' arrival. Instead, there is only the clashing sound of armor and melee as the Fellowship battle an unforeseen enemy who could stop them in their tracks; indeed, the audience sees Frodo be almost killed in this fight… and stories generally cannot continue without their main character. This technique is also seen in *Pirates of the Caribbean: Dead Man's Chest* upon the arrival of the Kraken. As the beast approaches the Black

Pearl nothing can be heard save for the creaking of the ship, and its attack is accompanied by nothing but the breaking of wood and screaming of the crew. In both cases, the audience has no choice but to simply watch as mayhem unfolds; and the lack of music may work narratively to symbolize the surprise of the characters and the 'wrench' thrown into the plot. These are confrontations not expected by the characters and thus not prepared for; it then makes sense for there to be a lack of music to reflect the idea that the arrivals of the Cave Troll and the Kraken were not 'planned for' or anticipated on their journeys yet have a very real potential to stop the story — and thus the music — in its tracks. The distinct lack of music also highlights the scene at hand as one that stands incongruently to the rest of the scored film, thus making that particular sequence more memorable to the audience and pivotal in their own right.

How Horror Does It

As previously mentioned, horror movies can exploit silence and sound design by subverting expectations and highlighting the 'sinister' characteristics and discomfort found in the lack of sound. The most famous and extreme example of this in the horror genre is of course *A Quiet Place* (2018) scored by Marco Beltrami, a brilliant example of music, silence, and sound design applied in horror. Moviegoers may recall that the release of this movie, and the experience of it in a theater, was unique: the premise of hunting by sound had not yet been taken to this extreme, and particularly not in the context of a family who primarily communicates via ASL. How would it work without audible dialogue? Many thought it would be too boring. Upon release, however, those questions were swiftly dashed as audiences found themselves paralyzed in their seats, jumping and screaming at innocuous sounds like crunch of popcorn or the opening of a cinema door: they were *that* scared.

The creators of this movie accomplished this level of fright so effectively by mixing long-established horror conventions regarding silence and the *jumpscare* with less-often considered forms and applications of silence and sound. For one, any semi-informed horror audience already has an *a priori* association of quiet moments and beats of silence with upcoming jumpscares and extremes in sensory input. By taking this idea and augmenting it to the size of a feature-length film, the audience loses a bit of that confidence in their expectations as sound and silence begin to function outside of their expected forms. The identification of sound as a herald of danger, for one, works to create an association between the two concepts to the point that an innocuous sound such as popcorn or a closing door can feel like an attack. Furthermore, the involvement of silence in the plot as an identifiable tool of safety necessitates the audience to become active participants in the narrative experience of the film by being as quiet as possible. This in fact serves to terrify viewers even *more* by then highlighting moments of horror in different forms of silence and eradicating the feeling of safety from every perceptual angle. By this I mean the difference between 'heard' silence and 'absolute' silence.

The philosophical debate regarding 'silence' as a 'real thing' has been ongoing and is multifaceted to the point that it warrants its own separate review for which this paper is not intended to address. Most importantly is the distinction of silence as relative and context-specific, as well done in *A Quiet Place* with the juxtaposition of silence from the perspective of the hearing vs the non-hearing. To the hearing, 'silence' as we are used to it is not often *silent*: it is rather filled with ambient sounds and background noise that we learn to ignore. Yet as the deaf may hear it, silence is exactly that: absolutely nothing. *A Quiet Place* works in both of these perspectives, forcing the audience to experience the horrors that are unique in different forms of 'silence.' This is felt in one of the film's first scenes depicting the family

crossing a bridge in silence until the noise of a toy leads them into danger. In combining the experiences of the hearing and the deaf in this scene, the audience feels both the terror of the parents when they hear something they shouldn't, as well as the confusion of the deaf daughter who can only see that something has gone wrong. The audience quickly learns that neither form of perception is preferable, both awful in their own particular ways: to know when danger is coming, or to never know when it is right behind you.

A lack of musical timing on account of silence also serves to heighten surprise as there is no point of temporal reference to anchor one's perception of time. In other words, silences and subtle Lynch-esque sound design can cause everything to feel off-beat and off-guard, disorienting the audience and their expectations of what could come next and *when* it will come. By using silence in these ways, *A Quiet Place* cornered its audience into a space with no refuge, finding no safety in sound *or* in silence.

Psycho

Silence — the marked lack of music — plays a relatively large role in *Psycho* (1960), as music functions more as a framing device for different scenes and dialogue rather than direct accompaniment or underscoring. *Psycho* is again unusual in that over half of the film is 'silent,' using very few musical cues and often distilling and recycling thematic material (Herrmann, 1960). This isn't necessarily a downside, as the dialogue in *Psycho* is interesting enough that silences do not feel uncomfortable. This doesn't mean, however, that there is no deliberate use of silence as a psychological tool in the context of the movie.

We return once again to the iconic murder of Marion in the motel shower. Although the scene has certainly been rendered iconic through Herrmann's composition of the high strings, the surprise itself is only as effective as the silence preceding it. It is no mistake that just before

Bates' 'mother' enters the bathroom, nothing can be heard save for the constant stream of water from the shower. Marion does not hum, no squeaky pipes or rattling from the rainstorm is heard, and there is absolutely no aural indication that another person has entered the motel room: no latch of a door, no squeaky hinges, no footsteps. Eitan and Granot's (2006) findings regarding auditory cues in spatial awareness could help to explain how the silence preceding Marion's death is so effective in how the audience can see 'Mrs. Bates' but not hear any indication of her presence.

The silence immediately following Marion's murder is also powerful in emphasizing the finality of her death and allowing the audience's shock to persist past the moment of shock. It is an interesting an effective juxtaposition against moment of silence preceding the murder, showing how silence can be felt differently by the audience, depending on context. In this case, the silence before Marion's murder is uncomfortable with apprehension while the silence that follows is more disturbing as the viewer is forced to watch and listen to Marion's demise. Without a musical buffer or frame of reference to apply to the scene apart from 'The Murder,' the audience must take in the scene just as it is: the murder of an unwitting yet paranoid woman trapped in a rainstorm where no help will find her. The water will keep running, inside and out, washing it all away.

Halloween

Functional silence is not uncommon in Carpenter's *Halloween* (1978), though there are particular instances of deliberate quiet that work to complete the creepy atmosphere of the movie. *Halloween* takes *Psycho*'s idea of silence preceding danger a step further, reliably providing silence before the appearance of Michael Myers throughout the film, highlighting the disparity between his size and the lack of sound in his movements and creating an uncomfortable

association between silence and his unseen presence. Silence is used in this way especially in scenes accompanying the deaths of Annie, Bob, and Lynda: instead of facilitating atmospheric undertones with quiet sustained dissonances, silence allows for the setting to speak for and beyond itself. By this I mean that without any aural (or visual) indication as to where Myers is or where he will be next, the creators can exploit "theatre of the mind," as Irwin Yablans (Volk-Weiss, 2021) describes. In the context of sci-fi and horror genres, 'theatre of the mind' refers to the power of the mind to imagine scenes of horror more effectively than film could ever convey. This is seen exploited in *Psycho* (1960), for example: even though the audience never *sees* the knife stab Marion, the music and their imagination is more than enough to make up for it, even to the point that viewers later recalled it being shown in color, or being more violent than it really was (Cooke, 2008). In the case of *Halloween* (1978), the deprivation of orienting clues immediately before the appearance of Myers and strengthening the association between silence and himself exploits the audience's 'theatre of the mind' by encouraging them to imagine all of the places Myers *could* be that are *just* out of eyeshot, entertaining the idea that the danger is everywhere all at once. Combining this feeling of threat with the disparity between his size and sound level, the film starts to lend credence to the developing idea that Myers is literally a (potentially supernatural) unstoppable killing machine.

The final chase scene between Myers and Laurie has already been discussed as relating to dynamics and instrumentation, but silence also plays a functional role in the tension felt as Laurie refuses to give up against her assailant, even when he keeps coming back. With the built association between silence and Myers' activity, the silence that follows Laurie's apparent victory is by no means comforting; instead, the audience is so used to Myers' phantom movement that Laurie's choice to fetch the kids seems naïve — doesn't she know there's still danger!? The use

of pure silence rather than sustained sound further highlights the characterization of Myers as a "machine" that can turn "ON" or "OFF"; there's no in between.

Scream

Scream employs 'silence' as a space for non-musical noise to build a scene's atmosphere in a particularly Lynchian way. Throughout the film the audience can hear electronic drones fade into the film's background and, with no particular tonal center and an unusual timbre, they are often rendered as more atmospheric than 'musical,' per se.

Similarly to *Psycho* (1960), *Scream* has no issue with allowing important dialogue to hold the sole focus of the viewer: that is, many instances of dialogue are not underscored with any particular musical or electronic sound. This allows for changes in the atmospheric soundscape to feel more deliberate and important… for example, the sheriff's office needs no other aural indicators than the occasional ring of an office phone and closing of desk drawers. Although these sounds aren't 'silence' as we know it in the absolute sense, the silence of musical input blocks the audience from applying any particular narrative meaning on the setting other than the simple fact that it's a sheriff's office. Only when Dewey leaves to check the status of the 'Ghostface' mask is the silence interrupted by a low hum as Sidney makes eye contact with Billy. The disruption of the silence upon seeing Billy works to raise suspicion on his character, particularly as someone who should in any other case be the safer bet. In experiencing this congruence, the audience begins to see Sidney's paranoia as increasingly reasonable, combined with a non-diegetic status to show that it is not just simply in Sidney's head but a real narrative reality. Low tones such as these that interrupt 'ambient silence' of a scene are common, particularly in scenes including Billy, Stu, and any questioning of their innocence.

Alongside its horror-related function, Silence in *Scream* (1996) is unique to *Psycho* (1960) and *Halloween* (1978) in how it functions comedically. As tongue-in-cheek as it is, the film has many moments and details that poke fun at common horror conventions such as phantom phone calls and false-scares; however, the recognition of these moments as parody rather than serious is dependent on how such moments are atmospherically set and musically accompanied. Some moments are appropriately musically accompanied so as not to distract from the terror of the scene: for example, if silence accompanied the amount of times that Ghostface slips, falls, or is hit, the audience may stop taking him as seriously as he is meant to be portrayed. On the other hand, silence also gives more overtly funny moments room to breathe without getting too ironically bogged down, such as Randy's rant to Stu in the video store about how "the police are always off-track with this shit. If they watched *Prom Night* they'd save time! There's a formula to it, a *Very! Simple! Formula*! Everybody's a suspect!" Although Randy's outburst is intended to make the audience wary of the character, musical accompaniment would have given *too* much narrative weight to his words and their comedic value would have been lost in suspicion. Furthermore, the later instrumental cue to Stu and Billy's guilt, as previously discussed, would not have been nearly as effective in its portrayal if it were to follow a similar accompaniment for a different character. Overall, silence in *Scream* acts as a scale to balance the portrayals of horror and comedy in the film without either getting lost or too overwhelming.

Concluding Thoughts

Opposite to the perceptual effects of dynamics, silence has the ability to leave the viewer stranded in the dark, lost at sea, floating in space, frozen out of time forever. It is interesting to see how the "absence" of something, something that is so hard to quantify, can still be effectively observed and learned from. It goes without saying that further study is necessary on the operationalization of the concept so that it can be considered across domains; its ethnological and philosophical debate is far too deep and varied to even attempt to define in such a straightforward way.

Conclusion

As discussed in this paper, The musical components of instrumentation, dynamics, diegesis, and silence in the horror genre, as specifically shown in *Psycho* (1960), *Halloween* (1978), and *Scream* (1996), have meaningful and measurable psychological effects on expectation, in turn influencing our perception and thus guiding our understanding of events. While nearly all genres of film utilize these components to their narrative advantage, the horror genre's clear intention of *scaring* the audience allows for identifiable isolation of such parts to be psychologically analyzed in a functional context. Through observation of both iconic and generic horror flicks — and extending our considerations beyond — we have seen how instrumentation can provide context clues and raise our alarm systems; we can understand how dynamics can be used to indicate incoming danger or 'fake' the audience out; we have realized the functional importance of diegesis on interpretations of on-screen events and characters; and we can recognize the importance of 'silence' as an emphatic narrative tool. We can thus employ our understanding of these components beyond the scope of the horror genre, and even further beyond film in general, to appreciate their psychological power in multiple contexts.

To review, the basis of reasoning lies in Boltz's (2001) explanation of *schema theory* and how we attend to details based on relevance to our experiences. Through manipulation of musical mood accompanying a neutral scene, Boltz showed that differently valenced music — *happy* vs *sad*, or *aggressive* vs *timid* — significantly changed viewers' interpretations of a scene's emotions and characters, and even primed them to attend to and remember certain relevant objects, some of which weren't actually present in the scene. This knowledge of selective attention can then be applied to Marshall and Cohen's Congruence-Association-Model (CAM), originally proposed in 1988 but since developed to include multiple different 'surfaces'

of input: music, movement, sound effects, speech, text, and visual input. When the musical surface is structurally congruent with another surface, their combined input is then prioritized in the process of understanding the *working narrative*. It thus stands to reason that the congruence of music with a particular surface — the rhythm of Rocky's movement in his grand training montage, for example — will guide the attention accordingly to notice particular details of such surfaces — *how* Rocky moves and how his actions synchronize with the triumphant music — in a viewer's consideration of what is important.

Broader Implications

So what broader importance does the study and manipulation of instrumentation, dynamics, diegesis, and silence hold? Taking them one by one, we come across these considerations:

The recognition of instrumentation as contextually and technically important, as well as the potential codification of certain instruments as particularly effective at displaying particular moods, raises some interesting questions in the therapeutic sense. The associations between instrumentation and certain genres, time periods, and settings, become semanticized as we experience them repeatedly over the course of our lives. As music has evolved over time, so has its style, instrumental uses, and timbral profile. This means that when we hear muted trumpets and swinging woodwinds, for example, we simply *know* we are witnessing something in relation to the Swing era of the 30's and 40's. As such, the presentation of music that is recognizably of a time gone by to people with episodic memory impairments and retrograde amnesia may help them to recall associated autobiographical information that may have been semanticized over time.

This idea was corroborated by findings of the inimitable Oliver Sacks in his book *Musicophilia*, providing anecdotes of people whose loved ones had been diagnosed with Dementia and severely disabled, but whose "essential person miraculously remains" upon playing an instrument learned earlier in life (Sacks, 2007, p. 337). A particularly striking case he describes is of a man named Clive, who suffered a brain infection that capped his memory capacity to a couple of seconds at most. For years, he described his life as "one night five years long," with no "dreaming, no touch, no taste, no smell, no sight, no sound, no hearing, nothing at all. It's like being dead" (Sacks, 2007, pp. 191-192). However, his ability to read music, sing, play the organ, and conduct choirs was still "perfectly" preserved with "his own unique style." While it has been observed that procedural memory is not typically affected in patients with hippocampal damage and organic amnesia (Gluck et al., 2020, the particularly interesting thing about Clive was the infusion of "intelligence and feeling" into his performances, seemingly re-activating a "mode of self" that is "seemingly untouched by his amnesia, even though his autobiographical self… is virtually lost" (Sacks, 2007, p. 210). This idea is not limited only to those who are musically knowledgeable, however; it may only need to be timbrally familiar to pull one out of a demented state, if only for a short period of time. Sacks notes,

> Familiar music acts as a sort of Proustian mnemonic, eliciting emotions and associations that had been long forgotten, giving the patient access once again to moods and memories, thoughts and worlds that had seemingly become lost. Faces assume expression as the old music is recognized and its emotional power felt. One or two people, perhaps, start to sing along, others join them, and soon

> the entire group – many of them virtually speechless before – is singing together, as much as they are able. (p. 344)

It is an amazing effect of music to be able to bring those who have lost their sense of selves back to the surface of reality to be concretely experiencing an identifiable *now*, pulling them out of an otherwise inescapable abyss. Thus, it may be of interest to look into applications of continual musical presence, particularly of familiar style and instrumentation, in Nursing Homes and institutions for the cognitively handicapped as a means of improving their general quality of life and providing an anchor for them to hold onto.

Dynamics have been observed to influence viewers' perceptions of distance and size as related to threat and dominance, often interacting with pitch range and timing. It may be fruitful to further understand the parameters of expectation that dynamics target; that is, how long could a person stand to hear an increasing sound level before reacting? In other words, as well put by Charles Bornstein of the *Halloween* production team, "how far can you stretch the rubber band before you knew it was gonna snap" (Volk-Weiss, 2021)? What are the limits of expectation as relative to dynamics? It would be particularly interesting to study the threshold of aural oversenstization through the use of dynamic extremes as an extension of its relationship to habituation and sensitization. Is there a particular dynamic range that elicits one impression different to that of a different range? Dynamics also influence the amount of attention we devote to any particular musical detail, and so emphases on other components such as instrumentation or rhythm for the greatest effect. This can have further therapeutic implications for those with

‘movement disorders,’ with rhythmic emphasis and stability acting as a kinetic anchor for the listener. Sacks again provides anecdotal support for this notion, noting that rhythm can act as an equalizer for stuttered movements and an external cue for initiating movement, allowing a person to regain motor control for as long as the rhythm is steady (2007, p. 250). The manipulation of dynamics may be of importance here in finding music that is *most* effective in treatment, and the combination of this study with that of instrumentation may lead to the development of therapeutic methods that can target more than one neurodegenerative disease.

Given the amount of empirical literature — or lack thereof — regarding diegesis and silence, it would be most fruitful to conduct future studies to more explicitly understand their impact on cognition, perception, and expectation. This is particularly true in the case of silence, for which a universal definition is not actually found. Some consider "silence" to be the complete lack of sound; others believe it is simply the sound we cannot hear; and still others consider silence as non-musical ambience which is how this paper considers the term. Although there have been multitudes of philosophical considerations, there are yet to be studies regarding the effect of 'silence' on perception as it could relate to sensory deprivation and fear of the unknown. The closest anecdote available is from none other than John Cage, relaying his experience in a sensory deprivation chamber as still hearing “two sounds, one high and one low… the high one was my nervous system in operation, the low one my blood in circulation… Until I die there will be sounds. And they will continue following my death” (John Cage, 2011, as cited by Ochoa Gautier, 2015, p. 184). Nonetheless, the recognition of silence as an identifiable thing in and of itself is incredibly important in a musical, psychological, and global sense. It is in moments of silence that we most often find ourselves in deep thought or reflection;

in moments of silence that we share grief; and in such moments that we can feel most alone. It can be both suffocating and allow us room to breathe.

The role of silence in horror also serves to remind us how heavily we may rely on auditory cues to make sense of the spaces we occupy. This is also applicable to the function of diegesis on our perceptions of a scene and raises interesting questions regarding how sound & music can shape a space, and how we determine what is 'appropriate' aural accompaniment for any given scenario. The awareness of cultural discrepancies is especially important in these considerations, perhaps calling for a more social psychological approach rather than cognitive. How may our own self-perceptions and personal identities, as informed by the cultures in which we've developed, change our aural and musical perceptions? How may in-grouping and self-assimilation perpetuate such systems and cycles, thus further influencing (and constricting) the larger "official" canon of music and sound?

The role of diegesis on interpretation of a scene raises questions regarding how a space's atmosphere is created, and how our experiences and interactions with said atmosphere are then further impacted. The most obvious point is that the idea of 'diegesis' isn't necessarily applicable to our experienced lives: there is no 'universal music' playing behind the sky that we can't hear (at least to our knowledge). The closest thing we can find may be the music that the people around us listen to on their headphones or through their car radios, music which we are not privy to but nonetheless colors the experiences of those who are. In that sense, we have no way of knowing how others' soundtracks guide their day, what beat they walk to on their way to work and what song they identify with on that morning. This may then factor into the concept of the fundamental attribution error, through which we tend to take others' actions out of situational contexts and perceive them more personally (e.g. someone cuts you off in traffic and you may

think “what a careless, self-centered asshole!” when in reality they may be rushing to the hospital). It begs the question: how may we differ in our interactions with other people, if we knew the soundtrack of their lives?

Everyone has a favorite song. Everyone has a beat they walk to. Everyone has a soundtrack that follows them in every step they take in their story.

How do you like yours?

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Appendix

Audio-Visual Media

Titles alphabetized; Clips in order of appearance (Click the underline, it's a link!)

1917 (2017; Sam Mendes, dir.; Thomas Newman, comp.)
- The Battlefield Run

Alien (1979; Ridley Scott, dir.; Jerry Goldsmith, comp.)
- Main Title Theme

A Quiet Place (2018; John Krasinski, dir.; Marco Beltrami, comp.)
- First Scene(s) - Beau's Death

Baby Driver (2017; Edgar Wright, dir.; Steven Price, mus.)
- The Coffee Run

Bride of Frankenstein, The (1935; James Whale, dir.; Franz Waxman, comp.)
- The Monster Meets His Bride

Clockwork Orange, A (1971; Stanley Kubrick, dir.; Wendy Carlos, comp.)

Conjuring, The (2013; James Wan, dir.; Joseph Bishara, comp.)
- Hide and Clap

Ghostbusters (1984; Ivan Reitman, dir.; Elmer Bernstein, comp.)
- The Library Ghost

Halloween (1978; John Carpenter, dir. & comp.)
- The Chase
- Don't Fear the Reaper
- Michael Myers' Synth Cue & Silence
- Final Chase (continued)

Hellboy (2004; Guillermo del Toro, dir.; Marco Beltrami, comp.)

Insidious (2010; James Wan, dir.; Joseph Bishara, comp.)
- A Face Made of Fire: Jump Scare

Isle of Dogs (2018; Wes Anderson, dir.; Alexandre Desplat, comp.)
- Taiko Drumming
- Opening Scene

Jaws (1975; Steven Spielberg, dir.; John Williams, comp.)
Theme Song
Chrissie's Last Swim

Lord of the Rings: The Fellowship of the Ring (2001; Peter Jackson, dir.; Howard Shore, comp.)
The Shire
Formation of the Fellowship
Opening Lore
The Balrog
The Cave Troll

Minority Report (2002; Steven Spielberg, dir.; John Williams, comp.)
The Mall

Monty Python and the Holy Grail (1975; Terry Gilliam, dir.; Terry Jones, dir.)
Sir Lancelot's Approach

Pirates of the Caribbean: At World's End (2007; Gore Verbinski, dir.; Hans Zimmer, comp.)
Davy Jones and Calypso's Music Box

Pirates of the Caribbean: Dead Man's Chest (2006; Gore Verbinski, dir.; Hans Zimmer, comp.)
Davy Jones' Organ
The Kraken

Psycho (1960; Alfred Hitchcock, dir.; Bernard Herrmann, comp.)
The Murder
Marion's Flight & The Rainstorm
Prelude/The City
'Clever' Norman

Rebecca (1940; Alfred Hitchcock, dir.; Franz Waxman, comp.)
Rebecca's Bedroom

Rocky (1976; John Avildsen, dir.; Bill Conti, comp.)
The Training Montage

Scream (1996; Wes Craven, dir.; Marco Beltrami, comp.)
Everybody Is A Suspect!
Sidney's Lament
Sidney After School
Halloween in Scream
The Sheriff's Office

Seven Samurai (1954; Akira Kurosawa, dir.; Fumio Hayasaka, comp.)
Theme

Shining, The (1980; Stanley Kubrick, dir.; Wendy Carlos & Rachel Elkind, comp.)

Sinister (2012; Scott Derrickson, dir.; Christopher Young, comp.)
The Lawnmower Scene - Sound, Silence, and Jumpscare

Twin Peaks (1990; David Lynch, creator; Angelo Badalamenti, comp.)
Twin Peaks Sounds

Up (2009; Pete Docter, dir.; Michael Giacchino, comp.)
Married Life

Vertigo (1958; Alfred Hitchcock, dir.; Bernard Herrmann, comp.)

World War Z (2013; Mark Forster, dir.; Marco Beltrami, comp.)

Audio-Only Media

4'33"; John Cage, 1952.

Adagio for Strings; Samuel Barber, 1936

Amériques; Edgard Varèse, 1918-1921

Atmosphères; György Ligeti, 1961

Bohème, La; Giacomo Puccini, 1893-1895

"Bridal Chorus", The; Richard Wagner, 1850

Canon in D; Johann Pachelbel; N/A

Danse Macabre; Camille Saint-Saëns, 1875

Disintegration Loops, The; William Basinski, 2002

"(Don't Fear) The Reaper"; Blue Öyster Cult, 1976

"Don't Fear The Reaper"; Gus Black, 1996

"Harlem Shuffle"; Bob & Earl, 1965

Isle of the Dead; Sergei Rachmaninoff, 1908

"Moon River"; Henry Mancini, 1961

Nutcracker, The; Pyotr Tchaikovsky, 1892

Pomp and Circumstance; Sir Edward Elgar,

Rite of Spring, The; Igor Stravinsky, 1917

Threnody for the Victims of Hiroshima; Krzysztof Penderecki, 1961

Glossary

Acoustic Startle Response

An automatic reaction to loud sounds that causes all mammals to jump. Think of when you 'startle' at a crack of thunder or jump scares in scary movies; or when someone "boo!" and you jump a bit!

Articulation

Refers to how a musical note/phrase is physically played by the performer – are the notes super smooth and connected, or short and 'pecky?' There are more musically technical names for these descriptions — *legato* and *staccato*, respectively — but they all refer to articulation.

Black Book

The programmatic score accompanying a piece of (oftentimes stage) media such as operas, ballets, and musicals; it contains all necessary information to play alongside the production in real time. You could think of a 'black book' as a musician's "script" that takes them page by page, scene by scene through the production.

Conditioning

The process through which we learn.

Classical (Pavlovian) Conditioning

"A form of learning in which an animal acquires the expectation that a given stimulus predicts a specific upcoming important event" - Gluck et al., 2020

Delay conditioning

A conditioning procedure in which the stimulus predictive of an outcome does not end before the outcome occurs, thus strengthening their learned associations. This is often used in horror movies to stretch expectations and maximize the effects of the 'jump scare.'

Observational Conditioning

"A process in which an individual learns an emotional response after observing similar responses in others" - Gluck et al., 2020

Operant Conditioning

> "The process whereby organisms learn to make or to refrain from making certain responses in order to obtain or avoid certain outcomes" - Gluck et al., 2020

Congruence-Association-Model (CAM)

"An information flow diagram representing five levels of mental activity underlying the joint processing of music and five other kinds of continuous information as depicted by six respective channels" - Cohen, Oxford Handbook of Music Psych, pp. 731. The six informational channels in question are text, speech, visual, music, sound FX, and kinesthetic.

Declarative Memory

Memory/Knowledge that you are aware you have, and that you can articulate.

Episodic Memory

Memory/Knowledge relating to personal experiences, spatially and temporally tagged.

Semantic Memory

Memory/Knowledge relating to objective facts, not spatially or temporally associated with a personal experience.

Diegesis

The "in-movieness" of a stimulus in a film. In other words, can the characters hear the music that you as the audience hear? Is it something that they can interact with and are aware of, thus existing *inside* or *outside* the cinematic world at hand?

Down-bow

When playing a stringed instrument, using the bow from the "frog" where the hand is to the "tip" of the bow, effectively pulling the bow.

Dynamics

Musical reference to the changing and different sound levels throughout a piece of music.

Crescendo (<)

An increase of loudness in a musical phrase.

Diminuendo (>)

A decrease of loudness in a musical phrase.

Forte (f)

Literally, “loud.”

Mezzo (m)

Literally, “medium” – combined with “forte” and “piano” to indicate *mezzo-piano* (medium-soft) or *mezzo-forte* (medium-loud).

Piano (p)

Literally, “soft.”

Glissando

A smooth, uninterrupted movement between intervals, but less intervallically constrained than a *slur.*

Habituation

The process of “getting used” to a repeated stimulus over time. Think about the times you’ve been unable to sleep in unfamiliar places because there were so many odd sounds, but those who live there tend to doze right off because they have learned to ignore such sounds as years have gone by.

Harmony

Harmony is heard in how intervals stack against each other to create *major*, *minor*, *augmented*, and *diminished* chords, thus impacting the emotional valences displayed through their performance.

Harmonic Series

Also known as the *overtone series*, this is an “efficient virtual compendium for intervals of all possible sizes… An abstract resource that basically contains, in efficient arrangement, all the musical intervals we will ever need” - Gann, 2019. Thanks Kyle!! :)

Instrumentation

Also known as *orchestration*, refers to the literal make-up of instruments to play a piece.

Brass

Inclusive of all instruments that (you guessed it) are made from brass (or chrome, or copper if you’re quite fancy, or something comparable). Examples are: Trumpet, trombone, French horn, tuba, and euphonium, to name a few.

Percussion

Inclusive of all instruments that are played by being stricken in some form, either by the hand or an instrument such as a mallet or hammer. Although the Piano is technically strung, it and its related keyboard cousins are considered percussive, as the hitting of a key releases a hammer to *hit* a corresponding string rather than *pluck* or *strum* it.

Strings

Inclusive of all stringed instruments, including violins, violas, celli and bassi, as well as the harp, guitar, lute, Oud, and many others. Stringed instruments can be bowed or plucked.

Woodwinds

Inclusive of all instruments through which a surface to play *against* (such as a reed or lip plate) is necessary to produce the desired sound. This is the difference between woodwind and brasswind, as brasswinds simply amplify the vibration of the player's lips against each other, while woodwinds amplify the vibration of *air*. Woodwinds thus include the oboe, flute, clarinet, saxophone, and bassoon families.

Jump Scare

A particularly scary event oftentimes preceded by silence or notably low sound levels, and followed by extreme dynamic levels on the louder end. Jump scares often include something "jumping out" at the character/audience, thus causing the audience themselves to jump.

Key Signature

Refers to the arrangement of pitches in a scale. Major and minor scales are inherently related, thus allowing composers to play with modal mixture and manipulation of tonal centers.

Major

Intervals are slightly larger, more consonant and harmonies are generally more positively valenced.

Minor

Intervals are slightly smaller, more dissonant and harmonies are generally more negatively valenced.

Melody

The main musical line that is generally given most attentional weight, and is what is 'sung' or 'hummed' along to by an audience member, or by someone in a later, separate context.

Moog synthesizer

An electronic musical instrument that is able to synthesize sounds of multiple different instrumental families, used to great effect by Wendy Carlos.

Multi-Store Model of Memory

Atkinson & Shiffrin's explanation of how information travels from sensory memory to Short Term Memory and eventually to Long Term Memory, but only through maintenance and rehearsal of information.

Novachord

First polyphonic synthesizer, popularized by Waxman and Tiomkin in *Rebecca* and *High Noon*, respectively

Pitch

The 'named' identity of a tone such as 'A-flat' or 'G-sharp' — historically, these names used to actually refer to two separate pitches, but have over time have become considered *enharmonic* (sounding the same).

Priming

"A phenomenon in which prior exposure to a stimulus can improve the ability to recognize that stimulus later" - Gluck et al., 2020

Range

The limits of pitch height and depth that an instrument or instrumentation is capable of.

Score

Music composed to specifically accompany a piece of media… different from a 'Black Book,' as a score can exist without being marked and prepared for present performance.

Sensitization

A process through which one's responses to stimuli will increase in magnitude through repeated instances. Sensitization and its relationship to habituation are seen clearly in studies of the acoustic startle response.

Schema Theory

Referring to the organizational system our brains maintain to keep track of information based on relevancy, so that the color "yellow" more easily conjures the image of a school bus, banana, or lemon, for example.

Silence

The marked absence of music.

Soundtracking

The compilation of music and sounds, including electronic effects and popular songs, that are applied to a film. For example, *Lord of the Rings* is scored, while *Baby Driver* is soundtracked.

"Theatre of the Mind"

The ability of the mind to more effectively scare itself through imagination than the visuals of a film could ever hope to.

Theremin

An electronic instrument that is played by changing one's hand positions in the air without touching the instrument itself.

Timbre

Refers to the 'tone,' or perhaps 'color' of an instrument's sonorities. An oboe has a different *timbre* than a clarinet, implicitly heard in their respective performances.

Tropes

"The Final Girl"

Refers to the "last standing" girl at the end of the movie that tends to fit a particular 'prudish' profile that remains responsible, sober, and (oh so importantly) virgin. *Scream* does an excellent job at laying out such rules.

"Babysitter Murders"

A trope mostly ascribed to Carpenter's *Halloween* and Myers' stalking of Laurie, Annie, and Lynda, who are all neighborhood babysitters. Generally refers to an unwitting babysitter who is either hunted, stalked, "called from inside the house," etc..

"Scream Queens"

Refers to actresses who are considered capstones of the horror genre, iconic for their screams and portrayals of 'Final Girls.' Janet Leigh, Jamie Lee Curtis, and Neve Campbell have all been named "Scream Queens" for their respective portrayals in *Psycho*, *Halloween*, and *Scream.*

Up-bow

To play a stringed instrument from the tip of the bow (the pointy part) to the frog (where the hand is), effectively pushing the bow to glide across the string.