A WORLD WITHIN REACH: A NEUROANIMATIC PERSPECTIVE ON THEMES OF THREAT IN THE MINIATURE WORLD OF CORALINE

In 2009 Studio LAIKA's much anticipated adaptation of Neil Gaiman's book *Coraline*[1] premiered at the Portland International Film Festival.[2] The excitement surrounding the film's release was due, in part, to the digital renaissance of 3D stereoscopic film that was taking place at the time, and which saw its stop-motion feature debut in *Coraline*. However, this was not the only emerging technology to be showcased in the film: *Coraline*'s use of digital design and printing to produce facial animation, seen by many for the first time in this film, was arguably of more interest. Replacement animation was not new, having been used decades earlier by animators such as George Pal and more recently by Henry Selick for facial animation in *The Nightmare Before Christmas* (1993). However, by 2009 advances in digital technology allowed animators to design and animate the puppets' replacement face pieces digitally and print them using a 3D rapid prototyping printer.. This resulted in incredibly smooth facial movement that could at first sight be mistaken for CG animation. Additionally, the film's miniature costumes, props and sets were constructed with accurate scaled-down detail. Many were created using the same 3D printing technology while others were painstakingly crafted by hand, such as Coraline's sweater and gloves, which were hand-knitted on tiny sewing needles. In the 'making of' material that accompanies the DVD, Georgina Haynes, character fabrication supervisor on *Coraline*, emphasizes the importance of making sure that the puppets and props are perfectly and accurately scaled down versions of their real-word equivalents, saying: 'It's all about making sure that nothing gives away the scale.'[3]

While the makers of *Coraline* focused on creating a perfectly animated and scaled-down world, two other stop-motion films released in the same year, *Mary and Max* (Adam Eliott, 2009) and *Fantastic Mr. Fox (Wes Anderson, 2009)*, took a different approach. Rather than trying to hide the method of production and the inaccuracies of scale that often accompany stop-motion, both films allow these things to remain obvious. Max's tracksuit,

for example, is very clearly sculpted from clay, utilizing the same visible finger-print approach that has been made famous by Aardman Animation's claymation films. The bubbles in Max's bubble bath are visibly made from white beads or balls with only a passing resemblance to real bubbles. Similarly, *Fantastic Mr. Fox* celebrates rather than disguises the method of its production, using sets that are often sparse in detail and slightly mis-scaled, reminding the spectator of a child's farmyard toy or model railway. The film does not try to hide the slight movement of the character's fur that is produced accidentally when the animator touches the puppet in order to manipulate it. This was common in animation created prior to the introduction of video assist technology in the 1990s.[4] Used in *Fantastic Mr. Fox,* it not only references earlier animation, but is also a visual reminder of the actions of the animator and the stop-motion method of production.

The words 'handmade' and 'handcrafted' are regularly used in relation to stop-motion animation.[5] Indeed, the hand-made aesthetic is arguably one of the most important and defining aspects of the medium. Yet many of the techniques used to create *Coraline's* perfectly scaled replica of the real world, such as the jumper knitted on tiny needles or the perfectly scaled digitally printed props, render the method of production less visible than its 2009 competitors. Despite this, the film still contains unmissable references to its miniature real-world existence. The most notable of these, and most central to the original narrative, are the expressionless button eyes of the Other Mother and Father. Another clue is present in the visible inner skeleton of the Other Mother, the fingers of which are made from fine sewing needles. What is particularly interesting is that while the button eyes were provided by Gaiman's original story and are intrinsic to the narrative, the visible armature and its needle fingers are unique to the animated film. They are not without narrative purpose of course; alongside the button eyes, the needle fingers act as visual signifiers of the jeopardy that Coraline faces in the story. However, these needles are not scaled down; each finger is made from a single needle, which indicates that the puppet is small and doll-sized, appearing to act *against* the apparent desire of the filmmakers to render the real-world scale of the puppets invisible.

This raises an interesting conundrum: on the one hand there is an apparent desire to disguise the scale, and so the method of production; yet on the other hand there seems to be a realization that making the scale and the method of production visible is important to the way that stop-motion film communicates to its audiences. Neuroscientists V.S. Ramachandran and W. Hirstein assert that artists are, in a sense, neuroscientists who unconsciously deploy an intuitive understanding of the workings of the human brain when creating art.[6] For example a caricaturist knows instinctively how to exaggerate certain aspects of a face or body to create an image that reveals something of the 'essence' of the subject. A landscape artist knows how to manipulate paint so as to not only replicate the scene, but also to tell the viewer something about the 'essence' of the scene, something that cannot be seen in the real world.[7] Both caricaturist and landscape artist are able to do this because they have an understanding of the way that human beings read images, and have skill in manipulating this through their art. If Ramachandran and Hirstein's hypothesis is correct, might this not also be true of stop-motion filmmakers? Could the makers of *Coraline* be innately picking up on some neural process that links artifact, medium and content, and that benefits from some elements of the stop-motion technique remaining visible? This chapter will take a neuroanimatic approach to this question. That is to say that it will apply neuroscientific and neuroaesthetic knowledge of the human visual processes and will seek to unravel the relationship between the visual signifiers in *Coraline*, the stop-motion method, and the narrative needs of Gaiman's story.

Neuroscience can be a contentious method when it comes to studying what is essentially a cultural artifact. Although the use of neuroscience in arts research is becoming more widespread, there is still the potential for valid criticism.[8] It is therefore prudent to establish the limitations, as well as the benefits, of neuroanimatics. Developments in fMRI and PET scanning have meant that researchers have been able to make significant advances over recent decades, but there is still a great deal about the functioning of the brain that we do not yet understand. The neuroscientific avenues explored in this chapter are therefore similarly limited; neuroanimatics is not by any means the be-all and end-all of the study of stop-motion animation spectatorship.

Not only is the brain an extremely complex organ, but it has also been found to be incredibly plastic. What this means is that it has the ability to adapt to the conditions that it finds itself in, such as particular environmental, social and cultural conditions and, to an extent, to physical injuries. Genes provide the brain with a blueprint, just as they do for the rest of the body, but experience dictates how that blueprint develops.[9] There are, however, sufficient similarities to be able to draw valid conclusions about the nature of visual perception, which are due in part to the genetic blueprint and in part to basic consistencies in the physical world that all newborn infants find themselves in. For example, light usually comes from above, which creates consistencies in the behavior of light and shadow and causes the related visual processes of different humans to develop in a largely consistent way. Sharp objects pierce the skin, regardless of culture or an individual's situation, leading humans to have broadly similar responses to the threat of injury. So, while there may be many differences in the way that individuals perceive a film or an artwork, there are also considerable similarities that allow valid generalizations to be made. Where it is possible within the confines of this chapter, the issue of individual experience and difference will be addressed; otherwise, the reader should assume that the things being discussed here are not likely to apply in equal measure to all human spectators.

Animation is ostensibly a non-realist film medium. Although animation can, and often does, imitate the conventions of live action-film production, most animation does not possess the indexical reality of live action film; that is to say there is no direct link between the representation and the thing that is being represented. Stop motion is unique in this respect. Although the characters of Coraline and Wybie are not real people, and the house where Coraline lives is not a real house, they are real miniature objects that exist in the real physical world. The world of Coraline can be walked around, explored, and perhaps most importantly of all it can be touched. It is this unique quality, and its potential effect on the brain, that is at the core of the issue being investigated in this chapter.

The haptic nature of stop-motion animation has been commented upon by animators and scholars alike. Jan Švankmajer was fascinated with the

tactile nature of objects and with what he referred to as the 'tactile imagination'.[10] This can be seen in many of his animated films such as *The Fall of the House of Usher (*1980) and *Dimensions of Dialogue* (1982) and is something that Švankmajer wrote about at length.[11] Aardman Animations similarly created a visual trademark out of the visible fingerprints that animators leave on the clay puppets. The tactile quality of stop-motion animation has also been noted by Ellen Rocha.[12] Rocha describes it as 'embodied' spectatorship; audiences are not only looking with their eyes but are also *feeling* the animation via memory and previous experiences of touch. This use of the word 'embodied' is apt as the term 'embodied brain' is often used in neuroscience to stress the brain's connectedness to, and reliance on, the body and its experiences.[13] One area where this connection is especially relevant, and which is related to the issue addressed in this chapter, is the neuroscientific theory of 'simulation'.

Neural Simulation

Prior to the word being adopted by neuroscience, 'simulation' was used to refer to theories from philosophy of mind that sought to explain how it is that human beings are able to read the intentions of other people.[14] More recently it has been used to describe the neural processes that scientists believe underpin not only the ability to read intentions, but also our ability to empathize with, bond with, and learn from other people.[15]

Our understanding of the neural activity involved with these abilities first came to light via the research of Italian neuroscientist Giacomo Rizzolatti, who had been conducting experiments with macaque monkeys. Rizzolatti's researchers found that when one monkey watched another monkey carry out a goal-oriented action (an action driven by an intention), the active parts of the brain of the observing monkey were almost identical to the active parts of the brain of the monkey carrying out the action. Rizzolatti and his team went on to identify the specific neurons that were involved in this process and named them 'mirror neurons'; the observer's brain *mirrors* that of the observed subject.[16]

Science has not identified specific 'mirror neurons' in human beings and it is not yet known exactly how this process works in our own brains. However, there is a compelling amount of evidence indicating that a similar, but more sophisticated, system does exist in humans.[17] Human brains not only simulate goal-related actions but can also simulate the separate movements that make up a goal-related action. Furthermore, we can simulate complete actions based on the observation of only a part of the action. For example, if we watch someone moving their arm as if to reach for an object but do not see the object being grasped, our brain simulates the entire action of reaching and grasping. We also simulate when we *imagine* carrying out actions.[18] There is additional evidence to suggest that we are able to simulate the actions involved in chewing and eating.[19] These simulations largely take place in the motor control areas of the brain; this is the bit of the brain that controls our muscles. It is as if we were doing the action ourselves, but without the neural activity that creates the actual physical movement. The evidence also indicates that our body's experiences of carrying out actions ourselves play a key role in this ability, hence the emphasis on *embodied* simulation.[20]

Our ability to understand the emotions of others is also rooted in simulation, as is our ability to imagine emotions.[21] Again it is the motor control area of the brain that is activated. We simulate the facial expressions and posture of those we observe and we are able to simulate the associated emotion from our own brain's experiences of muscle activity and matching emotions. Our brains can also simulate the senses of the flesh, such as touch and pain.[22] We do not actually *feel* the pain, but experience a keen sense of it. Once again it is our own body's experiences that facilitate the simulation. Perhaps unsurprisingly, neural simulations have been found to be stronger if the person who is watching or imagining an act has experience of having previously carried out that same act.[23] The uniqueness of individual experience of course means that there are variations in the extent to which the process works in individuals.

Neural simulation is thought to serve several important functions such as facilitating the learning of motor skills, and emotional bonding between

humans, both of which have implications for stop-motion animation and the phenomena that are apparent in *Coraline*. [24]

Simulation and Animation Spectatorship

Animated characters are, of course, neither human nor real living beings. This raises the issue of how effectively our brains can create neural simulations of things that only imitate real life. Non-human characters can without doubt elicit strong human emotions, as can be seen in films such as *Mary and Max* or *Bambi* (James Algar et al, 1942). It could be argued that this is due to the human voice actors, or our conscious knowledge of the narrative; it would therefore be untrue to claim that the ability of these to elicit emotional reactions is entirely down to empathetic responses triggered by vision. However, there is evidence showing that neural simulation can be provoked by the observation of non-human and non-real bodies. For example, it has been found that we are able to simulate the actions of animals, providing that our own anatomical structure can carry out the actions that we observe in the animal.[25] We are also able to effectively simulate the actions of an illustrated animated walk cycle[26] and of a human represented by only a few moving pinpoints of light.[27] It is therefore reasonable to assume that human beings are able to simulate the actions and emotions that are apparent in non-real stop-motion characters.

Where this research becomes particularly pertinent to *Coraline*, however, is not simply in the human ability to simulate movement and emotion, but in our ability to also simulate the sensations of the flesh. Freedberg and Gallese use the example of Caravaggio's painting of *The Incredulity of St Thomas* to demonstrate this.[28] The painting depicts Thomas inserting his finger into a wound in Jesus's torso; looking at this picture causes the observer to become acutely aware of the sensations in the corresponding parts of their own body. Animators such as Robert Morgan, the Quay Brothers and Jan Švankmajer have explored this potential to great effect in their stop-motion films, creating a strong sense of threat to the body through scenes that invoke an awareness of our own flesh (see figure 1). While *Coraline* does not utilize this technique to the same extent, there are

similar themes of bodily threat present that are key to successfully portraying the film's narrative, and which will be discussed in detail in the final section of this chapter.

A second way in which the neuroscientific research is particularly pertinent to *Coraline* is through our ability to simulate *implied* actions; these are actions that we do not see, but that leave behind some kind of visible evidence. Freedberg and Gallese argue that marks such as the brushstrokes on a van Gogh painting or the paint splatters of a Pollock painting *imply* the movement that created the artwork and provoke a simulation of that action.[29] There is compelling evidence to support this idea; research has found that the observers of hand-written letter forms simulate the movements associated with creating the letter forms.[30]

Again this is something that animators such as Švankmajer and Nick Park have made effective use of by purposefully showing the fingerprints of the animator.[31] It is unlikely that these animators would have been familiar with the neuroscience involved, but they were no doubt aware of the strengths of the medium and the effect that leaving these marks would have on the audience. In view of our ability to simulate implied gestures, it is perhaps not surprising that Ellen Rocha notes that stop-motion spectatorship is a particularly 'haptic' and 'embodied' experience.[32]

A further aspect of implied gesture that is highly relevant to stop-motion animation is the way that the human brain simulates grasping and manipulation actions. Studies have found that that when we watch another person grasping an object, or when we imagine grasping an object, a simulation of the motor neuron activity involved in grasping takes place.[33] This also occurs when we look at photographs of hands carrying out, or about to carry out, grasping actions.[34] Furthermore, it has been found that our brain simulates grasping and manipulating actions simply by observing graspable or manipulatable objects such as tools.[35] The visible indication of the potential of an object to be grasped or manipulated provokes a simulation of that action.

A film like *Coraline,* therefore, could trigger simulation in three ways:

firstly by provoking simulation of the actions and emotions of the characters; secondly by provoking simulation of the sensations of the flesh of those characters; and thirdly, by provoking simulation of the implied actions of the animators. Each of these simulations is dependent on the audience being able to identify the things that they see on screen as real-world miniature objects. On the surface it appears that this kind of technique is something that the makers of *Coraline* strove to avoid, preferring to hide signs of the scale and real world existence of the puppets and animators. However, a closer examination of the film will reveal that the filmmakers, perhaps unconsciously, replaced obvious visual clues with subtler references to the real-world nature and scale of the animated world.

Simulation and Themes of Threat in *Coraline*

The opening section of this chapter identified two key elements that provide *Coraline*'s audience with clues to the real-world scale of the objects that we see on screen. These are the button eyes of the other mother and father and the visible armature of the other mother with its sewing-needle fingers. This last section of the chapter will examine the ways that Henry Selick and his production team, through a keen understanding of their medium, have used these elements to tap into stop motion's unique embodied spectatorship qualities.

The button eyes of the Other Mother and Father are one of the most important elements of Gaiman's original story. They function both as a literal threat of physical harm and as a symbolic threat of the de-humanising, or de-souling, of Coraline. Due to the size and scale of real buttons and their common use as eyes on children's toys, stop motion was perhaps the only medium that could bring a visual logic to their presence in the narrative. Indeed, Priebe suggests that the book may have been written with stop motion in mind.[36] However, in the light of the visual processes discussed above, the button eyes in the film take on additional significance. The scale of the buttons, together with the audience's past experiences of handling toys, show us that the puppets are likely to be toy-like in their proportions. This

allows our brain to identify the world of Coraline as a miniature space that exists within our real world, within reach of our grasping hands. Once the puppets have registered as graspable, the animated movement and the implied movement of the animator indicates to our brains that these puppets are also *manipulatable*. Baring in mind that the identification of graspable and manipulatable objects provokes simulations of grasping and manipulating, the animated puppets in *Coraline* are likely to provoke similar simulations. While the perfectly scaled down clothing and the computer-generated face pieces might hide the real-world scale of the puppets, other elements, such as the button eyes, re-establish it. It is not surprising that Peter Lord once said of stop-motion animation that it is like watching an 'invisible spirit transforming the puppet into a living being'.[37]

The button eyes are of course a key part of Gaiman's original narrative and are not unique to the film. However, Selick and his production team have added a host of additional reminders of the miniature scale of the puppets, which cannot be attributed to the original narrative. During a scene in which the Other Father attempts to help Coraline, the Other Mother pulls a string coming from his ear; this string de-activates his ability to speak. The scene alludes to the type of child's doll that plays a short piece of pre-recorded speech when a string is pulled and draws attention to the possibility that the things on screen can likewise be manipulated. A similar effect is created by the ragdoll that Coraline finds under her bed; in one scene she holds and manipulates the doll, mimicking its imagined responses to her questions and drawing attention to the fact that Coraline herself is manipulatable. The most significant added indicator of the real-world scale and nature of the film is the visibility of the Other Mother's armature. This is seen in the opening sequence and again towards the end of the film as the true nature of the Other Mother becomes apparent. The needle fingers of the armature are not scaled down, as with other elements of the film; they are a size appropriate to a real-world armature. This design, unique to the film, appears to go against the desire of the filmmakers to hide the scale of the puppets, instead reminding us of their graspable and manipulatable nature..

[Figure 2 here]

This last reminder, and its potential to encourage simulations of grasping, also has significance regarding the simulation of bodily sensation and pain. If we can imagine grasping the Other Mother's armature we can also imagine being injured by its sharp needle fingers, and we can then simulate the sensation of damage to the flesh that this would cause. This in turn echoes and amplifies the threat that the needle fingers represent to Coraline within the narrative; that is, the threat of having her flesh pierced by needles in order for the buttons to be sewn to her face. There are several further portents of this threat. During the opening scene in which we see the hands of the armature refashion the doll to resemble Coraline, we see the seams of the old doll sliced open, its innards/stuffing removed and replaced (see figure 1), the threads attaching the old eyes cut, and the eyes removed. Of particular significance is a shot of the replacement buttons being attached to the repurposed doll. In this shot a needle threads the cotton through the button from behind, pointing outwardly towards the camera and the audience. In the 3D stereoscopic version of the film, the needle protrudes into the space in front of the screen; but even without the 3D effect the threat of piercing is clearly established, and also felt by the audience. This threat is then repeated via shots of the buttons that the other mother has presented to Coraline. In the animated film these sit in a box on the kitchen table together with a reel of cotton and a needle. The Other Father reinforces the threat with the words "so sharp you won't feel a thing".

Following the opening sequence, we don't see the Other Mother's armature again until much later in the film when her true form is fully revealed. There are, however, occasional reminders of the threat to the flesh, some of which are very subtle and some of which are more obvious. For example, when leaving Mr. Bobinsky's house, Coraline picks up a pair of garden shears that are embedded point downwards in the wooden decking, using them to cut the rope that ties her suitcase to the roof of the family car. In a later scene we see that the Other Mother has sewn Wybie's mouth into a fake smile. The secateurs and indeed the entire gardening theme, together with the character

of Wybie, are present only in the film, as are the needle fingers of the Other Mother. All of these elements have the potential to stimulate an awareness of our own flesh through simulation, reinforcing the threat to the characters.

A further element involving bodily harm, present in the book and expanded upon in the film, is the severing of the Other Mother's hand. This takes place towards the end of the film as Coraline escapes, trapping and riving the hand as she closes the door to the other world. As with the threat of the buttons, this narrative element is foreshadowed and reinforced with additional visual references that are unique to the film. During the scene in which Miss Forcible and Miss Spink read Coraline's tea leaves, we see the shape of a clawed hand in the bottom of her cup. Similarly, one of the garden scenes ends with a shot of wispy clouds in front of the moon, ominously forming the shape of two severed hands. During the scene in which the Other Father sings to Coraline, the gardening machine takes control of his arms and hands by the use of mechanical gloves. In a later scene the Other Father prises one of the controlling gloves off his hand and it flies away from him, looking very much like a severed hand. In another scene we see Mr. Bobinsky bend over backwards and walk on all fours like a crab, resembling the way that the Other Mother's hand moves during the final scenes of the film.

These shots not only foreshadow the severed hand's role as the antagonist in Coraline's final battle, but create a triangle of visual indicators provoking simulations that enhance the narrative. The visible grasping hands provoke simulations of grasping gestures, adding to our awareness of our own hands and simulations of grasping the puppets. This and the proliferation of piercing tools on screen, including the needle fingers of the Other Mother, make us aware of the sensations of our own flesh, and the threat of damage to that flesh. The simulation of grasping the Other Mother's armature and being pierced by its needles similarly creates an unconsciously felt threat of injury to our own flesh. This in turn reinforces the central narrative theme of physical threat to Coraline's flesh.

It has to be acknowledged that these scenes probably don't provoke the same tangible simulation and awareness of our own flesh that some scenes in *Street of Crocodiles* (Stephen and Timothy Quay, 1986) or *Bobby*

Yeah (Robert Morgan, 2011) might provoke. Baring in mind that all human brains simulate slightly differently due to our differing experiences, the unconscious sensations that one audience member experiences might not be the same, or as strong, as those of another. Nevertheless, the scenes referred to above, at the very least, allude to the more tangible simulations of threat found in independent shorts, and arguably reproduce them in full in some scenes.

One last narrative trope that is relevant to the adaptation of *Coraline* from book to screen involves the theme of eating and of internal bodily sensations. Both stop motion and live action film have explored tropes of eating and the subversion of eating in order to create discomfort in the spectator. In Charlie Chaplin's *Modern Times* (1936), The Tramp is fed metal bolts by a mechanical feeding machine. The sense of internal discomfort that this scene provokes is quite disturbing, which is not surprising when you consider our brain's ability to simulate the things that we watch. Švankmajer has also used the theme of eating, and in particular of eating non-food items, to similar effect in his stop-motion animation *Jabberwocky* (1971), in which we see dolls eating the body parts of smaller dolls. As we are able to recognise the objects on screen as real things that we could eat in the real world, even if doing so would be quite unpleasant, the potential for simulation is palpable.

The importance of food in Gaiman's original story is established when Coraline expresses dislike of her father's 'recipes', preferring to eat pizza and microwave chips.[38] The Other Mother then uses an array of appetising food in an attempt to entice Coraline to remain in the other world. Once the Other Mother's true intentions are revealed the theme of eating becomes less pleasant as Gaiman describes the Other Mother eating live and wriggling beetles.[39] In the animation these become 'cocoa beetles from Zanzibar', which has the effect of making them seem slightly more palatable while maintaining the sense of discomfort that the neural simulation creates. This technique of using eating to create both pleasant and unpleasant sensations is developed further in Selick's animation. During one of the garden scenes Coraline eats candyfloss, which the Other Father shoots out of a cannon, and Miss Forcible and Miss Spink repeatedly offer Coraline pastel coloured

sweets, both of which are pleasant forms of eating. Later in the film, as the world that the Other Mother has created begins to break down and disintegrate, the sensations of eating that the film provokes become less enjoyable. Coraline finds the sisters wrapped in a giant sweet wrapper hanging above the stage in the theatre, looking very much like two entwined pieces of candy. In another scene Wybie teases Coraline by pretending to eat a somewhat slimy and stretchy slug. When Coraline is looking for the eyes of the children in the garden, the 'dragon-snapper' plants attempt to bite her. A low garden wall then opens up like a mouth and tree roots attempt to drag Coraline inside. The dragon-snapper flowers appear once again as cut flowers in a vase that are being hand fed by the Other Mother. The idea of ingestion is also alluded to by the presence of the tunnel that Coraline crawls through in order to get to the other world. In Gaiman's book this tunnel is simply a corridor, but in Selick's film it has the appearance of an organic internal space, such as an intestine.[40]

As with the other narrative tropes, the theme of eating provides a metaphor for the peril that Coraline is in; she is in danger of being swallowed up and digested by the Other Mother's world. However, in a stop-motion film in which we can see that the things being eaten and the things that are doing the eating are real objects, if not real digestible food, this theme also creates a powerful sense of ingestion and of the insides of our own bodies via the simulation of the things we see on screen. This is useful to a film in which a key narrative threat is one of harm to the body.

As with the threats of damage to the flesh, most of these visual indicators don't create the same level of simulation of eating and internal bodily discomfort that Chaplin's *Modern Times* or Švankmajer's *Jabberwocky* invoke. Selick and his production team needed to create a family friendly film that would be palatable to the general public and that would not be classified as animation horror. While children may not have the range of experiences to enable them to fully empathise with every situation, they will almost certainly have had some experiences that would allow them to simulate harm to the flesh. Due to this potential, a full and unrestrained use of stop motion's abilities to provoke simulation would not have been appropriate. With this in

mind, the steps taken to hide some of the more obvious signifiers of the real-world existence of *Coraline's* puppets, props and sets become understandable. Selick could not have used all of the methods discussed above with their potential to stimulate neural simulations without also taking steps to temper their effect. Michael Frierson describes Tim Burton's film *Vincent* (1982) as a kind of pastiche of B-horror movies.[41] In much the same way, Selick has created a kind of pastiche of the techniques used in the tactile animations of Morgan, Švankmajer and the Quays, and in so doing has been able to subtly invoke and allude to the same mechanisms without overly frightening or disgusting his audience.

The commonalities between the work of Morgan, Švankmajer and the Quays, and the feature animations of directors such as Selick and Burton indicate that stop motion has a predilection for content that involves threat to the body and might be described as either horror, or pastiche horror. The neuroscientific research discussed in this chapter offers a neuroanimatic explanation as to why this might be. It demonstrates that stop motion's unique potential can only be fully realised if audiences are able to identify that what they are seeing on screen exists in miniature form in the real world, whether that be through obvious indicators or through more subtle and tempered ones. However, this is by no means intended to be an all-encompassing and complete explanation of stop motion's particular properties. The research discussed in this chapter also does not imply that themes of harm to the flesh are the only themes that are well suited to stop-motion animation. Nevertheless, the theme of the threat of bodily harm is an important element in Gaiman's narrative that has been cleverly adapted to animation by Selick and his production team, providing just the right level of menace for the film's target audience.

To conclude this chapter, I would like to return to Ramachandran and Hirstein's assertion that artists are, in a sense, neuroscientists.[42] They are people who have a profound awareness of the relationship between their medium and the human spectators of their work, as well as a sophisticated understanding of how to use this relationship to communicate to an audience. Rather than saying that stop-motion has a tendency towards certain content, it

might be more accurate to say that it is the directors, animators, designers, puppet makers and prop makers, with their expert knowledge of medium and audience, who are drawn to and able to fully exploit narrative content, such as that which is found within Gaiman's *Coraline*.

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