Exploring Non-Verbal Robot Character Emotion through Kinesics: A Case Study of the Animated Film *WALL-E*

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ABSTRACT

Non-verbal communication is central to animated storytelling, particularly in films that rely on minimal dialogue. Previous studies of non-verbal communication in animation have focused largely on human and animal characters, leaving robot characters, whose mechanical bodies lack many human features, comparatively unexamined. This study investigates how non-verbal robot characters express emotion through body language, using the Pixar animated feature film *WALL-E* (2008) as a case study. Adopting a qualitative design, the study first reviewed twelve previous studies of non-verbal communication in animation to identify the dominant elements of analysis, and found that kinesics was applied in all twelve. Selected scenes featuring the robot characters WALL-E and EVE were then analysed using Birdwhistell's Kinesics Theory, supported by the Facial Action Coding System (FACS), across three kinesic elements: facial expression, gesture, and posture. The findings show that both characters convey five basic emotions (surprise, fear, joy, sadness, and anger) through stylised eye shapes, mechanical "eyebrows", hand and arm gestures, movement speed, and whole-body posture. Their mechanical design does not prevent emotional expression; instead, human emotional cues are translated into forms suited to each character's design. The study extends kinesics-based research in animation to robot characters and offers practical insight for animators and character designers. Future studies should examine additional non-verbal elements and more complex emotions.

Keywords: Animation, Kinesics, Non-Verbal Communication, Robot Character, Body Language, Emotion

INTRODUCTION

Animation has evolved from traditional hand-drawn techniques to computer-generated imagery (CGI), combining visual artistry with technological innovation to engage audiences of all ages (Karmakar, 2021). Characters are the primary means through which animated stories express feelings, ideas, and narrative. Even without spoken words, their body language and facial expressions enable audiences to understand their personalities and emotions (Sabri & Adiprabowo, 2022). Animated films with little or no dialogue can therefore communicate with a wide range of viewers through gesture, expression, and other visual cues (Azzahra & Djuharie, 2025).

Communication is commonly divided into verbal and non-verbal forms. Non-verbal communication is the exchange of messages without written or spoken words and may be expressed through the head, the face, other parts of the body, or the whole body (Uzun, 2020). Mehrabian's (1971) studies of how feelings and attitudes are communicated suggested that facial and bodily cues carry more weight than words when verbal and non-verbal messages are inconsistent. Body language, or kinesics, is the most fundamental component of non-verbal communication and may occur intentionally or unconsciously. The term, derived from the Greek *kinesis* ("motion"), was introduced by the American anthropologist Ray Birdwhistell (1952) and encompasses facial expression, gesture, posture, and eye contact (Aripin & Rahmat, 2019). Emotions are communicated through both facial expressions and body language (El-Hameed, 2024), as well as through voice and touch, with body posture and expressivity contributing substantially to how emotions are perceived (Pelachaud et al., 2021).

Robots present a particular challenge for the expression of emotion. A robot is generally a machine created to assist with, or take over, tasks that would otherwise require human effort (Ben-Ari & Mondada, 2017). Robots consist of a mechanical structure, actuators, and sensors; because their rigid links and joints are built for specific tasks, they usually have fewer degrees of freedom (DoF) than the human body and a correspondingly limited range of movement (Montecillo-Puente, 2010). *WALL-E* (Stanton, 2008), produced by Pixar Animation Studios and distributed by Walt Disney Pictures, tells the story of a waste-collecting robot left to clean an abandoned Earth. The film won the Academy Award for Best Animated Feature and relies heavily on non-verbal expression: meaning is communicated through the robots' facial expressions, gestures, and posture rather than through dialogue. This makes it a strong case for examining body language in robot characters.

In recent years, many animations have relied on non-verbal communication or silent storytelling, demonstrating that emotion and narrative can be conveyed effectively without dialogue (Sagheer et al., 2024). A review of twelve studies of non-verbal communication in animation (Table 4) shows that six examined 3D animation, four examined 2D animation, and two examined stop-motion animation. However, all twelve focused on human or animal characters, none specifically addressed robot characters, and only five discussed kinesics theory in detail. A full-length feature film was selected rather than a short film because a feature provides sufficient scenes and character development for a detailed analysis of body language.

This study therefore explores how non-verbal robot characters in *WALL-E* (Stanton, 2008) express emotion through body language. Its objectives are (a) to identify the elements of body language in robot character motion; (b) to analyse non-verbal robot expressions through body language using Birdwhistell's Kinesics Theory; and (c) to establish how non-verbal robot characters convey expression through body language. The findings are intended to inform students, animators, and researchers about character movement and to contribute to knowledge of non-verbal communication in animated film, in line with Sustainable Development Goal 4 (Quality Education).

LITERATURE REVIEW

Animation and Character Appeal

Animation is an effective medium that combines art and technology to engage audiences of all ages (Karmakar, 2021). Research on character appeal has examined design aesthetics, exaggeration of movement, and emotional investment, showing that a character's visual design is functional as well as aesthetic because it shapes how audiences interpret personality, emotion, and relatability (Patankar, 2025). Appeal is shaped not only by appearance but also by how a character moves; Pixar's exaggerated yet balanced proportions, for example, produce characters that are both expressive and visually appealing (Patankar, 2025). Pose, which involves body language and facial expression, is likewise recognised as a core element of character design (Fredriksson, 2017).

Non-Verbal Communication in Animation

Communication is the process of sharing thoughts, feelings, and ideas with others (Sagheer et al., 2024). Whereas verbal communication uses spoken and written language, non-verbal communication operates without it (Uzun, 2020). Non-verbal cues, sometimes described as "visible codes", can reveal people's traits, attitudes, and feelings more truthfully than spoken language (Bihari, 2022), and in animated films without dialogue they allow stories to reach a wide range of viewers (Azzahra & Djuharie, 2025).

Previous studies have identified several elements of non-verbal communication relevant to animation. Navarro (2025) highlights kinesics, proxemics, paralanguage, haptics, oculesics, and chronemics, while Wahyuni E and Husna (2025) describe proxemics, haptics, kinesics, and oculesics as the main categories. Kinesics refers to body language, including posture, gestures, and facial expressions; proxemics concerns the use of space and the distance between characters; paralanguage covers non-verbal aspects of speech such as pitch and pace; haptics refers to touch; oculesics concerns eye movement and eye contact (Wahyuni E & Husna, 2025); and chronemics concerns the use of time (Navarro, 2025). Although these elements have been analysed in different combinations, body movement, or kinesics, remains the most frequent focus.

Kinesics Theory

Kinesics is the study of how the body conveys messages non-verbally through movement (Birdwhistell, 1970). Body language has been defined as the gestures, movements, and mannerisms through which a person or animal communicates with others (Issa, 2017), and kinesics comprises three principal elements: facial expression, gesture, and posture (Aripin & Rahmat, 2019). Table 1 summarises these elements as applied in this study.

Table 1: Elements of Kinesics

No.	Kinesic Element	Description
1	Facial expression	Includes eye contact and movements of the forehead, eyebrows, mouth, and other features; even a slight change can alter the meaning of the message conveyed (Tresnasari, 2020).
2	Gesture	Body and hand movements used in communication, classified into emblems, illustrators, affect displays, regulators, and adaptors (Ekman & Friesen, 1969; Tresnasari, 2020).
3	Posture	The way the body is positioned while communicating, including while walking, talking, standing, and sitting (Tresnasari, 2020).

Because animated characters lack many of the subtle cues of real humans, careful attention to kinesics is needed to make their emotions believable. Kinesics therefore provides a foundation for non-verbal communication in animation, enabling animators to translate human behaviour into expressive motion that connects viewers with characters.

Emotion and Its Expression

The term *emotion* derives from the Latin *emovere*, meaning "to move out" or "to agitate", and generally refers to heightened feelings directed at events or objects in the world that motivate people to respond in particular ways (von Scheve & Slaby, 2019). Each emotion involves characteristic patterns of behaviour, including body posture, facial expression, vocal intonation, and gesture (von Scheve & Slaby, 2019). The Facial Action Coding System (FACS), developed by Ekman and Friesen (1978), documents the facial movements associated with emotional states and has become a primary reference for professionals in animation and psychology (Meyer, 2021). Ekman's cross-cultural research, including studies in Papua New Guinea, identified joy, sadness, fear, disgust, anger, and surprise as basic emotions shared across cultures (Ekman, 1992; Meyer, 2021). Table 2 summarises the facial and bodily cues associated with each basic emotion.

Table 2: Facial and Bodily Cues of the Basic Emotions

Emotion	Typical Facial and Bodily Cues
Joy	• Smiling face and relaxed posture
	• Lively movements such as jumping or a cheerful walk
Sadness	• Quietness and low energy
	• Slow or stationary behaviour, covering the face, minimal idle motion
Fear	• Wide eyes and a retracted chin; muscle tension and heightened awareness
	• Signals the urge to hide or flee; blinking is often suppressed while tracking a threat
Disgust	• Wrinkled nose and turning away
	• Physically distancing from the unpleasant source; fixed gaze
Anger	• Intense staring

	• Tense, aggressive movement; loss of patience and venting on nearby objects
Surprise	• Raised eyebrows, forehead wrinkles, and an open mouth
	• Brief duration; quick reactions such as jumping backward

Note. Adapted from Meyer (2021).

Robot Characters in Animation

Robot characters can be classified as humanoid, semi-humanoid, or non-humanoid according to how closely their bodies resemble human anatomy (Rousi & Haimes, 2024). Table 3 applies this classification to robot characters in animated feature films.

Table 3: Classification of Robot Characters in Animated Films

Category	Description	Examples (Animated Film)
Humanoid	Robots designed with body structures resembling humans (Rousi & Haimes, 2024).	*The Iron Giant* (1999), *Robots* (2005), *9* (2009), *Astro Boy* (2009), *Big Hero 6* (2014), *Next Gen* (2018), *The Mitchells vs. the Machines* (2021), *Transformers One* (2024), *The Wild Robot* (2024)
Non-humanoid	Robots that do not fully resemble human anatomy (Rousi & Haimes, 2024).	*WALL-E* (2008), *Ron's Gone Wrong* (2021)

Unlike humans, robots do not move freely; they are programmed to perform precise, controlled, and efficient movements, which distinguishes robotic kinesics from human kinesics. Robots with human-like bodies are often animated using human motion as a reference (Frijns et al., 2024), so their movements closely mirror those of people. To examine distinctly robotic body language, this study therefore focuses on non-humanoid robots that look more like machines than humans, which narrows the options to films such as *WALL-E* (2008) and *Ron's Gone Wrong* (2021). *WALL-E* was selected because its characters display mechanical motion and communicate primarily through body language with minimal dialogue. Although non-verbal communication in animation has been studied extensively, no study among those reviewed has examined how robot characters convey emotion through kinesics, and this is the gap the present study addresses.

METHODOLOGY

This study adopted a qualitative research design, which is suitable for exploring how meaning is expressed through visual design rather than through numerical data (Ellis & Hart, 2023). The animated film *WALL-E* (Stanton, 2008) served as the primary data source, with the analysis focusing on the characters' actions, movements, and expressions. Secondary data comprised academic articles, books, and other writing on non-verbal communication in animation, drawn from animation studies, communication theory, psychology, and media analysis. These sources situate the primary observations within a wider theoretical context and support a more comprehensive and less biased interpretation (Ellis & Hart, 2023).

The study proceeded in three phases aligned with its objectives. In Phase 1, a textual analysis of previous studies identified the elements of body language relevant to robot character motion. In Phase 2, a content study of selected scenes from *WALL-E* analysed the robots' expressions using Kinesics Theory. In Phase 3, the findings were synthesised to establish how non-verbal robot characters convey expression.

Conceptual Framework

A conceptual framework connects relevant concepts, previous research, and key theories so that the central concepts of a research problem can be clearly defined (Adom et al., 2018). As shown in Figure 1, this study combines Birdwhistell's Kinesics Theory, which treats gestures, postures, and other bodily movements as communicative (Aripin & Rahmat, 2019), with FACS as a complementary tool for identifying discrete facial movements associated with emotional states (Pelachaud et al., 2021). Where verbal communication is limited

or absent, the body may serve as the primary channel for emotion (Uzun, 2020), and body movements interact with facial expressions to support or change the perceived message (Meyer, 2021). Combining the two approaches therefore allows facial and bodily cues to be analysed together, which is important for animated characters whose movements are often exaggerated or stylised.

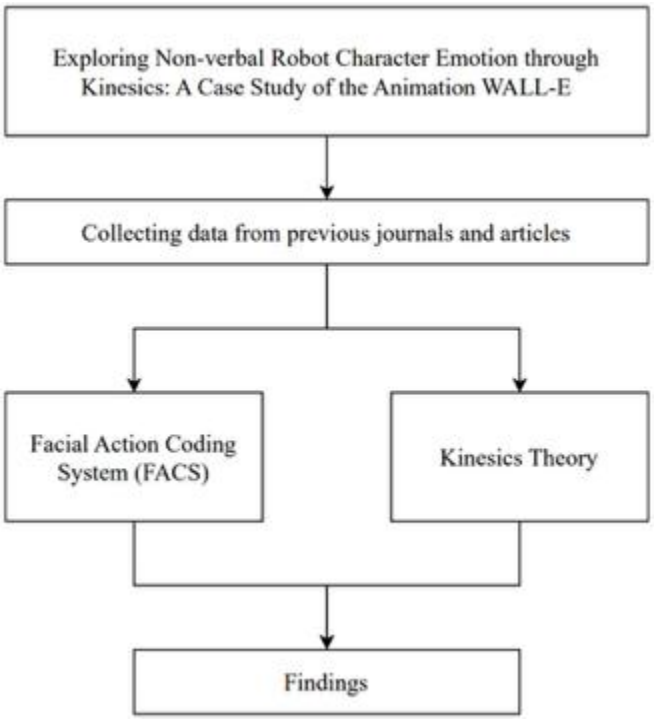

Figure 1: Conceptual Framework of the Study

Data Collection and Analysis

In Phase 1, twelve studies of non-verbal communication in animation were reviewed to determine which elements are most robust and relevant for analysing character emotion. Table 4 summarises each study, the type of character it examined, and the non-verbal elements it addressed.

Table 4: Previous Studies on Non-Verbal Communication in Animation

Study	Animation	Type	Kin.	Prox.	Para.	Hapt.	Ocul.	Chron.
Ngo (2018)	*Coraline*	Human	✓				✓*	
Tresnasari (2020)	*Diamond no Ace*	Human	✓				✓*	
Tandiary & Lukmanto (2020)	*Yue Bing*	Animal	✓					✓*
Sabri & Adiprabowo (2022)	*Leaving Home*	Human	✓					
Aini et al. (2023)	*Shaun the Sheep*	Animal	✓			✓*		
Zaneti & Sari (2023)	Animated series (fish characters)	Animal	✓		✓	✓		
Sagheer et al. (2024)	*Umbrella*	Human	✓	✓		✓	✓	
Ariyati & Catherine (2024)	*Tom and Jerry*	Animal	✓		✓*			
El-Hameed (2024)	Anti-bullying animated short	Human	✓	✓*		✓*	✓	
Navarro (2025)	*Arcane*	Human	✓	✓	✓	✓	✓*	✓*

Azzahra & Djuharie (2025)	*For the Birds*	Animal	✓	✓*	✓*			✓*
Wahyuni E & Husna (2025)	*Prognosis*	Human	✓*	✓*				✓*
Total			**12**	**5**	**4**	**5**	**5**	**4**

Note. Kin. = kinesics; Prox. = proxemics; Para. = paralanguage; Hapt. = haptics; Ocul. = oculesics; Chron. = chronemics. ✓ = element explicitly used; ✓* = element observed through close reading.

The studies varied in focus. Ngo (2018) argued that gesture can convey attitudinal meaning independently of language, while Tresnasari (2020) and Ariyati and Catherine (2024) combined non-verbal analysis with Barthes's and Peirce's semiotics, respectively. Tandiary and Lukmanto (2020) blended human and rabbit body language with the animation principles of secondary action and timing, and Aini et al. (2023) found gestures and facial expressions to be the most frequently applied cues in *Shaun the Sheep*. Zaneti and Sari (2023) treated facial expression and tone of voice as continuous signals whose meaning varies with intensity. Sagheer et al. (2024), El-Hameed (2024), and Navarro (2025) analysed several non-verbal elements systematically, with Navarro focusing on touch and proximity, while Azzahra and Djuharie (2025) and Wahyuni E and Husna (2025) examined how timing, movement, and animation principles convey emotion and meaning without dialogue.

Where a study did not explicitly name the elements it examined, they were classified through close reading against the definitions above: references to body language, body movement, posture, gesture, and facial expression were grouped as kinesics; distance, proximity, and space as proxemics; pitch, rate, and pace of voice as paralanguage; touch as haptics; eye gaze, eye movement, and eye contact as oculesics; and the use of time as chronemics. As Table 4 shows, kinesics appears in all twelve studies, whereas proxemics, haptics, and oculesics each appear in five and paralanguage and chronemics each appear in four. Of the six elements, only kinesics and proxemics are supported by a structured theory, and kinesics is the more detailed. Kinesics was therefore adopted as the sole analytical framework, as it classifies body movements as meaningful cues rather than random motion and enables systematic analysis of how expressions are constructed and interpreted.

In Phase 2, the film was viewed multiple times to identify scenes relevant to emotional expression, and screenshots were captured for analysis. Two characters, WALL-E and EVE (Figure 2), were selected because they display the most emotion across multiple scenes and because their contrasting designs (Table 5) influence how each expresses emotion through movement. Scenes with minimal dialogue were selected so that the analysis could focus on body language, and each scene was coded against the three kinesic elements using the cues summarised in Table 2. Disgust was excluded because no clear instance was identified in the film, leaving five basic emotions: surprise, fear, joy, sadness, and anger. Sound design and cinematography were considered only where they related directly to the characters' body language.



Figure 2: EVE (left) and WALL-E (right) in WALL-E (Stanton, 2008)

Table 5: Design Features of the Robot Characters in WALL-E (2008)

Character	Design Features
WALL-E	• Binocular-style eyes with retractable “eyebrows”
	• Box-shaped body
	• Tank-like tracks instead of legs
EVE	• Smooth, oval-shaped body
	• Large glowing blue eyes on a black screen
	• Floating design with no visible legs

The analysis followed fair-use principles for copyrighted material: screenshots are reproduced solely for scholarly analysis, with full acknowledgement of the original creators, and systematic coding against a defined framework was used to limit interpretive bias and support consistency.

FINDINGS AND DISCUSSION

The findings are organised by emotion. For each emotion, a representative scene is described and then analysed against the three kinesic elements; Table 6 summarises the results.

Surprise (WALL-E)



Figure 3: WALL-E Expressing Surprise

While following the security robots that are taking EVE away, WALL-E encounters busy traffic. It looks cautiously left and right, hesitating to enter the fast-moving stream, and in doing so loses track of EVE. When WALL-E realises that EVE has been carried much further away, its surprise is shown through the widening of its binocular-like eyes and the upward tilt of its “eyebrows”. The sudden spreading of its hands and an abrupt extension of its posture signal an unexpected event. These cues correspond to the raised eyebrows and quick physical reactions associated with surprise (Table 2).

Fear (WALL-E)



Figure 4: WALL-E Expressing Fear

WALL-E finds itself directly beneath a landing spaceship. Alarmed, it tries to escape the engine blast, but every direction is blocked by fire, so it digs into the ground for shelter. After the landing, it peeks out cautiously and moves forward slowly; when the spaceship door opens, it panics and folds itself into a compact box to reduce its exposure. Fear is expressed through "eyebrows" that arch and pull together and through wide-open eyes; through hesitant gestures such as slow steps and careful peeking; and through a closed posture that suggests a defensive readiness to hide, consistent with the urge to hide or flee described in Table 2.

Joy (EVE)



Figure 5: EVE Expressing Joy

After scanning the area for plant life, EVE watches the spaceship that delivered it leave Earth. Left unattended, it flies upwards and glides freely through the open sky. EVE's joy is conveyed through eyes shaped like "raised cheeks", imitating a smile expressed through the eyes. Spinning, soaring, and playful bursts of speed, together with outstretched arms, form the gestural cues, while an open, unrestrained body orientation conveys lightness and freedom of movement. These correspond to the lively, energetic movements associated with joy.

Sadness (EVE)



Figure 6: EVE Expressing Sadness

EVE delivers the plant to the Captain, who accesses its memory to learn about the condition of Earth. As the recording plays, EVE sees how WALL-E cared for it while it was in "sleep mode" and comes to regret its earlier harsh treatment of him. Sadness is shown through furrowed eyes that simulate lowered brows and a fixed downward gaze; EVE slowly joins its hands together as a sign of regret, while a slight slouch and lowered head complete the posture. Its movements are minimal and slow, reflecting the low energy and stillness associated with sadness.

Anger (EVE)

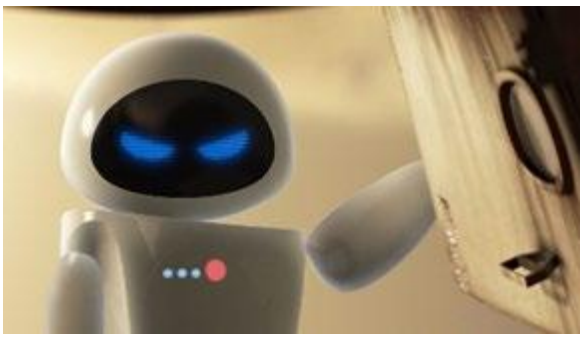

Figure 7: EVE Expressing Anger

Over several days and nights, EVE searches repeatedly for the plant without success. Frustrated, it slams a door after another failed scan and, when caught by an electromagnetic crane, fires erratically at the crane and nearby objects. Anger is visualised through sharply narrowed eyes; through forceful gestures such as slamming the door, aggressive forward movements, rapid firing, and sudden arm extensions; and through a rigid, tense, and confrontational posture. These cues mirror the intense staring, aggression, and venting on nearby objects associated with anger.

Table 6: Summary of Kinesic Analysis of Robot Character Emotions in WALL-E (2008)

Emotion (Character)	Facial Expression	Gesture	Posture
Surprise (WALL-E)	• Widened binocular-like eyes	• Sudden spreading of the hands	• Abrupt extension of the body
	• Upward tilt of "eyebrows"		
Fear (WALL-E)	• "Eyebrows" arched and pulled together	• Hesitant movement	• Closed, compact posture
	• Widened eyes	• Slow steps	
		• Careful peeking	
Joy (EVE)	• Eyes shaped as "raised cheeks"	• Spinning and soaring	• Open, unrestrained orientation
		• Playful bursts of speed	• Light, free movement
		• Outstretched arms	
Sadness (EVE)	• Furrowed eyes	• Slowly joining hands together	• Slight slouch
	• Downward gaze		• Head tilted down
Anger (EVE)	• Sharply narrowed eyes	• Slamming the door	• Rigid, tense body
		• Aggressive forward movement	• Erratic movement
		• Rapid firing	• Confrontational orientation
		• Forceful arm extensions	

Taken together, the findings show that both robots convey all five emotions through the three kinesic elements despite lacking full facial features. Their mechanical designs shape how each emotion is expressed. WALL-E's binocular eyes and retractable "eyebrows" act as its main facial channel, while its box-shaped body allows pronounced postural changes, such as folding into a compact box when afraid. EVE has no mouth or eyebrows, so its facial expression is carried entirely by the changing shape of its glowing eyes, while its floating, legless design shifts emotional emphasis to speed, trajectory, and arm movement. This supports the view that body posture and expressivity contribute substantially to emotional communication beyond the face (Pelachaud et al., 2021) and that facial and bodily cues work together to shape the perceived message (Meyer, 2021). The findings also extend previous kinesics-based studies of human and animal characters (e.g., Aini et al., 2023; Tresnasari, 2020) to non-humanoid robots, showing that a limited range of mechanical movement (Montecillo-Puente, 2010) need not restrict emotional expression when human cues are translated into forms suited to a character's design.

CONCLUSION

This study investigated how non-verbal robot characters express emotion through body language, focusing on WALL-E and EVE in the animated film *WALL-E* (Stanton, 2008). It addresses a gap in the literature, as previous studies of non-verbal communication in animation have examined human or animal characters rather than robots. The findings show that, even without full facial features, the robot characters communicate the basic emotions of joy, sadness, fear, anger, and surprise effectively through kinesics, comprising facial expression, gesture, and posture. Body language is therefore a powerful storytelling tool that conveys meaning to the audience in the absence of dialogue.

These results align with Kinesics Theory and extend previous research by showing that robot characters can communicate emotion in ways comparable to human and animal characters. Practically, the findings offer animators and character designers a reference for translating human emotional cues into the movement vocabulary of mechanical characters. The study is limited to a single film, two characters, and five basic emotions. Future research should combine kinesics with other non-verbal elements, such as proxemics and oculesics, compare robot characters across films and design categories, and investigate more complex emotions. Such work would deepen understanding of how mechanical characters convey nuanced expression and further inform animation and character design practice.

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