



# Performative Approaches in Designing Costumes: Ergonomics in Immersion and Storytelling

Alexandra Cabral<sup>(✉)</sup> and Carlos Manuel Figueiredo<sup>(✉)</sup>

CIAUD – Lisbon School of Architecture,  
Universidade de Lisboa, Lisbon, Portugal  
cabral.fashion@yahoo.com, cfigpt@gmail.com

**Abstract.** The case studies explore experimental practices and approaches to design based on costumes that lead to the characters' construction and of the plot itself and thus contribute to the immersion of performers and spectators into corresponding fictions. Semiotics and somatics gather in a visual vocabulary based on textiles, colors and garment shapes that tell stories, taking spectators to plausible universes or situations contextualized scenically. Participatory design is considered, with costumes as working tools for performers and directors. User-centered design processes that include the moving body as the mill of a costume's definition promote a staging under construction that turns the plot into a metaphor of the costumes' facets. This brings new symbolic and theoretical frameworks for both performing and designing. Thus, ergonomics is central in the creative process, implying original designs for these staging practices with no preliminary grounds and that rely on costumes as triggers for acting.

**Keywords:** Performance · Costume design · Ergonomics · Immersion · Storytelling

## 1 Theoretical Framework

This study aims to understand the interactions between the human element and other elements in a performative context, under an ergonomic framework related to how the body and body expression can be extended by that exchange. It is an approach based on practice that is, nevertheless, “theory-focused, on concepts which imply experimental approaches to performance art that explore body perception through costumes’ plastic potentialities and even its constraints” [1].

Costumes are enablers in performance, due to their somatic relationship with the usage of the body as a means of expression, therefore “our quest is to understand the actor on stage and the identities he enacts in costume” [2]. But embodiments in characters imply also the immersion in narratives they belong to, leading us to consider “performances in witch costumes are made to convey specific stories to an audience while moving the spectators emotionally and transform the actors psychologically” [2]. Here, the role of the director gains importance. The choices of a director on the conceptual elements of the narrative complement the visual language telling and the

interaction he aims. The design process needs to follow that up, because costumes express an emotional interaction between the character/actor's performance and the storytelling: "Design outcomes had to support in some way the understanding of audience engagement with (...) [the] performance and, if possible, increase that engagement" [3].

Clothing functionality and cognitive readings by the performer are linked to his self-expression and self-image, and also, "this self-image and self-expression tend to be read by spectators not only as an outer display, but also as an inner identity and emotion (...) they blend together with the performer's actions, (...) connecting the artistic expression with the clear notion of [his] selfness. In this process, communication is obviously involved" [1]. But costumes can play a narrative role both in compliance with the characters and other elements of the storytelling and set design, depending on how they are contextualized and emphasized: "The set is the frame and the context for the costume designer's work. (...) Without light the world that the designer makes for the performers and the audience is lifeless" [4]. Thus "A good costume 'tells' the audience about the status, relative wealth, age, profession or trade, attractiveness, temper and underlying psychic state of each character" [5], but they can tell much more about the story if used and framed appropriately, when "the visual effects help place the work in a context, give the characters depth and rigor, and underline and support the emotional content of the work. The nature of devised work lets a designer work with the director and performer to build the characters and the place of the story" [4].

In a designer's perspective, several materials and their combination can highlight or blend the costume and character in the scenic surrounding space and light: artifices like the thorough choice of transparencies, reflection, oversize volumes, neutral colors, can all allow mimetic relationships. Besides those, the perceived quality of fabrics, such as softness, coldness or warmth, can convey sensations to the spectator that he relates to the character's personality. Throughout the play, a costume can then perform a narrative or interactive role, depending on its fixed or dynamic features. Its possibilities of change and interaction can be achieved both with or without the use of smart and technological artifacts, although some art directors support that the use of smart approach is unnecessary: "we believed that fundamental questions about interaction and engagement could still be asked without recourse to 'smart' systems and materials" [3].

Smart textiles or smart design can include microcapsules, LEDs, optical wire, light sensitive prints or sensors in the costumes, textiles or props. These can add smell, light, shapes and color, which can change during the play and be interactively triggered. These changes can be partial or transform the costumes completely. They can be triggered by other characters/actors, by spectators, or by inner factors like scene lighting or sound. A costume change will have narrative intentions, assuming part of the storytelling. A costume can metamorphose during the play, into two or three different characters. These characters can be present simultaneously or be emphasized one by one. In any case, there is a unique set of visual vocabulary in the stage and light design that aims to reinforce the characters' personalities, actions and their fates in the plot. Emphasizing main moments of the scenes contribute to the spectator's immersion: "Spectators may experience interactions as secretive, expressive, suspenseful or

magical, depending on the visibility of interface manipulations and their effects, which each may be hidden, partially or fully revealed, and amplified” [6].

Nonetheless, the actor’s body, its expression and posture, together with the costume, plays a main role in the character’s construction, namely in its personality. The starting point is the body the actor aims to embody: “Performance practice has also been questioning the usage and reading of the body, (...) the imagined body as the starting point of the performer’s acting (...) [and] changes in body can as well be done by fashion, being fashion also deeply related to the notion of the self” [1]. Costumes can be involved in the performance creative process and that is even more valid in smart costume design, due to the evinced somatic characteristics and new relationships with the body. Seemingly, “actors should have sufficient time to train with the interactive features and rehearse while wearing the costumes and possibly should also be included in the creation process” [6]. The user-centered methodology used in the costume design process relies on the actors’ interference with costumes even from the very beginning, since their inputs are crucial to get to a point where actor, costume and character become one and only.

In live performance, an interactive costume can expand the expressiveness of the body: “A wearable art itself can be an expressive media platform and when it is worn by a performer, it elevates expression of body language” [7]. Art directors fiercely defend or deny the use of smart approaches in performances and play narratives, but both agree that “performing art can be an ideal platform for the wearable media as it provides creative expression for both wearable artist and performers” [7]. Some say that its use impoverishes the role of actors and directors in the making of the storytelling, turning it less authentic for relying more on external processes, rather than on the actor’s body expression, posture and projection. What is certainly true is that directing with «smart» or «non-smart» artifacts differs a lot. Connotations can be given to formal elements of the costumes and setting and the open nature of costumes, often present in simple forms, seems to suggest new possibilities of interpretation, rather than impose boundaries in their meaning. By this way, they become important storytelling elements for creating this close relationship with the plot, and do not necessarily need to be «smart»: “Instead of ‘smart’ textiles and computational wearables engaging audiences through technology, it seemed that the open nature, or thingliness, of the costumes had a powerful and complex effect on the relationship between performer and audience” [3]. We therefore consider that besides the conceptual approaches, there is a strategic balance between pros and cons in the core of the production related to human, technical and financial resources.

Costumes can also be given attributes linked to the scenic environment they inhabit. They can symbolize a prop or an object and they can stand for themselves alone in terms of meaning: they might become something else but the character, in the fictional space of the play. Their shapes, colors, textures and volumes convey metaphors that can trigger a particular narrative role in the spectator’s scenic imagery. The same stands for separating parts of the costume, making them autonomous props in the scene. The performance becomes a dialogue between the physical elements in space and the new possibilities of acting with them, which in the end needs to make sense in the narrative. A mentally and physically trained actor can foresee it, but it takes a lot of rehearsing for testing their true potential, since “an improvisation (...) needs precise rehearsal to happen, and no one



may know until strength and skill have developed further, whether it is actually possible. If it is, perhaps it will be incorporated into the narrative” [4]. Furthermore, interactive or shared costumes that involve the acting and that promote the interaction between actors and spectators imply a performance practice allied to a staging process under construction, where those relationships are pre-established in a certain framework. It is, nonetheless, a performance practice led by costumes but also actuated and defined by the chance implied in the duration of the interaction, promoting the creation of new meanings, because “the work revolves around the notion that each body and each body memory, gesture, deliberate and multiply [the] framed staging of the self in performance [and thus] leads to another layering of communication as bodily inscription” [8].

The ergonomics of a costume can then be more functional when linked to gestures or actions; more cognitive when promoting emotions and immersion in the realm of a certain production; more narrative when performing different roles or gaining attributes with new features and contextualization in tune with the storytelling. Semiotics can then play an important role in carrying the spectator through symbolic metaphoric spaces (including post-human) that costumes may suggest, proposing secondary levels of «meaning» telling, because “towards a reading of inhabiting space by wearing costumes, we need to consider the act of wearing in the impact on others, as a decoded language. Hence, a performer (and a costume designer), by deliberately choosing a signifying object for his performance is alluding to a certain social interpretative dimension” [1].

## 2 Case Studies

The case studies described below were held in 2014, during the exploratory design phase of the PhD research project title “Design of Dynamic and Interactive Costumes for Performance Art”, based at CIAUD Research Centre, developed by Alexandra Cabral (the first author) and supervised by Carlos Manuel Figueiredo (the second author), together with Cristina Carvalho. The costume design is by the first author.

### 2.1 Costume Design for *Little Thumb* Theatre Play

The first case under analysis portrays the costume design process for a theatre play by Seara – Companhia de Teatro de Beja (theatre company in Beja, Portugal) directed by David Silva, based on Charles Perrault’s *Little Thumb* tale, which started from a financial and human resources restricted set. With three actors for nine characters (Little Thumb, Lumberjack, Lumberjacks’ Wife, Lumberjack’s Sons, Giant, Giant’s Wife, Giant’s Daughters, and another two Little Thumbs), the actors enrolled a complex performative context where they assumed three different personalities each. They could not leave the stage to change clothes neither undress them, but they had to transform their costumes and assume different personalities in every garment change, in front of the audience – involving it, rather than distracting it from the plot.

The stage design was limited to a table, a black background and light projections, meaning that the costumes had a narrative role not only in compliance with the characters they represented but also with other elements of the story, as we will see. Before the limited space and the imposed nearness between actors, they faced

movement constrains, being the scenic space defined both by their location on set and their confined action fields.

Connotations were given to formal aspects of costumes through acting, which was essential to define the characters' psychology and physiognomy. Early prototypes were requested for improvisation purposes (Fig. 1, top left) although initial instructions had been given by the actors and the director, related to gestures, manners or stature, as well to technical features, such as pockets for carrying props. There was therefore a balance between a pre-established idea of how characters were meant to be and what costumes could allow in terms of presence and body movement.



**Fig. 1.** Rehearsing with prototypes (top left); using a costume to represent a light in the dark (right); using boots as the reins of a chariot (bottom left). *Little Thumb* theatre play by Seara – Companhia de Teatro de Beja, directed by David Silva. Costume design by Alexandra Cabral.

Conceptual elements in the narrative were strongly linked to a complementary visual language, according to the director. The *Rubik's Cube* imagery had to be present in the color blocking related to the character's changes. There were other references like the layers in a samurai's costume, Oskar Schlemmer's *Triadic Ballet* (1927) geometry and the simplicity in Malevich paintings. The design proposal was therefore based on monochromatic costumes with some hints of color (from the other characters' attire, which could not be hidden) and textures associated to narrative aspects, such as the pleating in the Giant's Daughters' dress, symbolizing them dying horizontally



(lying on their own beds), or the vertical pleating in the Lumberjack Sons' trousers, representing the trees in the forest they lived in.

The characters had a color correspondence, according to their griefs and sorrows, destinies or personality traces. The Lumberjack's Sons were dressed in green, due to the forest trees; the Giant's Daughters were dressed in red for dying with their throats cut; orange represented the Lumberjack being antsy; purple was related to the Lumberjack's wife sorrow or idea of death associated with the loss of her kids; blue was as cold as the Giant's nature; white, considered a pure color, belonged to Little Thumb's costume.

There was also a color code given to some aspects of the narrative, so that the costumes could also represent something else apart from the characters. Yellow represented the light in the dark, coming from the Giant's house, thus the Giant's Wife had a yellow dress (Fig. 1, right); before the absence of a physical door on set, her panel skirt could also make a door's turn. The Giant's boots were used to resemble the reins of a chariot (Fig. 1, bottom left). Therefore, shapes, colors and metaphors were hand-in-hand and anticipated the spectator's imagery on the narrative.

The décor had the contribution of the always present costumes that filled the spaces, either on the top of the table or bellow it and sometimes on both. The action in the woods was carried out underneath; the action inside the houses was done on the table top. There were also light projections in the shapes of hats and crowns, indicating the passage from boys to girls (the Lumberjack's Sons vs the Giant's Daughters), guiding the spectator in the quick changes between them and anticipating the tragic moment of one of them dying.

The user-centered methodology used in the costume design process was based on letting the actors interfere in it by wearing prototypes, manipulating them and giving feedback on their usability during the rehearsals – but observing directly how they moved was important to correct mistakes missed before in the costumes' characteristics. Nevertheless, the initial possibilities of the costumes were already tested in small scale (1:25) prototypes that predicted what movements/passages from character to character were possible. Even so, it was important to check if the attired could provide a smooth convincing passage between characters to the audience. And since fastenings were also a little difficult to accomplish by the actors, extra rehearsals had to be done for the actors to practice over and over, until they would perform the passages without stumbling – and those could be then perceived «magically». We can see the transformation from Little Thumb into Lumberjack on stage in Fig. 2.



**Fig. 2.** Transformation from Little Thumb, in white, into Lumberjack, in orange, on stage (rehearsal). *Little Thumb* theatre play by Seara – Companhia de Teatro de Beja, directed by David Silva. Costume design by Alexandra Cabral.

Each actor had to perform two different characters apart from Little Thumb. There was, nonetheless, one «main» Little Thumb character, therefore two of them could be semi-present, that is, from the hip up. A few steps were needed to achieve the transformations, such: as moving panels sideways (transforming trousers into a skirt – Fig. 3, 1.1–1.2); dressing some parts upwards (turning a hemline into a turtle neck, blouse in Fig. 3, 1.1–1.2); unzipping and pulling some pieces down, revealing white pieces underneath (Fig. 3, 1.3 and 2.3); throwing them to the back and over the head, turning a skirt into a top (Fig. 3, 2.1–2.2) or changing from one vest to another (from the orange one to the red underneath, Fig. 3, 3.1–3.2).



**Fig. 3.** Costume's transitions: Lumberjack's Sons/green (1.1); Giant's Wife/yellow (1.2); Little Thumb/white (1.3); Lumberjack's Wife/purple (2.1); Giant/blue (2.2); Little Thumb/white (2.3); Lumberjack/orange (3.1); Giant's Daughters/red (3.2); Main Little Thumb/white (3.3).

The actors needed for this play had to be highly skilled and focused, since they could have to move and speak independently during the transformations between characters. The costumes' color blocking minimized the chances of them getting mistaken, being each color related to a certain character. The shapes and textures of each costume were different, also helping the actors to embody them. Besides, the pace factor related to each transformation differed. All these small details mattered in memorizing the steps needed for the costumes' manipulation.

The light design of the play emphasized the central moments of the scenes, meaning that the transformations were not always highlighted, therefore the actors had to memorize how to perform their gestures with almost no light. But the focus on the actor under a low-key lighting helped engage the audience, immersed in the performer's ability to embody constant change into different characters. The costumes



encompassed a somatic effect: after a while, the spectators could predict which characters would appear on set, although they could not guess properly how the transformations were done, as they were carried out rather quickly.

Considering the importance of these costumes in the staging process, it can be said that there was co-creation in the staging of the play itself between the costume designer and the director – costumes somehow simultaneously constricted and emphasized the acting process, thus nourishing the director's vision. There was no end for the play and the costumes contributed with the solution: the show was about misery and it was convenient to have three Little Thumbs bowing and begging to the audience. Besides, and as mentioned above, costumes also represented physical elements of the scenic environment (such as houses, trees or lights). In sum, costumes established a broader relationship with the plot, contributing positively for revising the way the narrative was constructed, and of course, the way the story could be told.

## 2.2 Costume Design for *Epidemia* Theatre Play

*Epidemia* was a theatre play by David Silva, performed again by Seara, about the new digital technologies and their «epidemic» usage, being the characters an iphone and an ipad. The plot highlighted the dependence people have on this kind of gadgets, making them lose touch with reality. The director had particular requests regarding the direct relationship between lighting and costumes, making them resemble the electronic devices. They had also to be easy to dress and undress on stage.

Transparent and shiny fabrics were used to make the costumes resemble screen surfaces. To emphasize the technological sensation, they had some volume and distance from the body, allowing light projections to fill into the «gaps», adding the impression that costumes were embedded with their own light. Altering between opaque and transparent parts also added the impression of depth in that distance. Moreover, their neutral colors allowed the stage lights to be incorporated, creating a consistency in the décor. Everything was flooded with light of the same color, since costumes could «change» color along with the scenery (Fig. 4).



**Fig. 4.** Costumes transformed by the light design. *Epidemia* by David Silva, performed by Seara – Companhia de Teatro de Beja. Light design by Paulo Santos. Costume design by Alexandra Cabral.



The technological resemblance in the costumes made the audience and the light designer wonder on the presence of an actual electronic technology in them. This led us question how we can make-believe in performance practices through materiality. Performance practices comprehend both strategies, technological and non-technological, being the choice itself a purely strategic decision that considers conceptual and logistic dynamics, according to the global design of the theatre play. The use of technology, electronic in this case, would represent more investment, both financially and collaboratively. As the staging occurred outside at night, the need for a technologically advanced costume was not relevant, because the impact of the lights on the costumes were enough to create a good visual impact. Immersion in the narrative would then be assured. This analysis emphasized the spectators' point of view on the visual grammar and narrative coherence of the play and into what extent the costume design would follow their expectations.

There is a semiotic facet in this theatre play that carries the spectator along the symbolic metaphoric spaces the characters live in. There is some human reminiscence in the costumes, the characters still had arms, legs, heads. They were humans turning into gadgets, or gadgets becoming human-like entities. This dichotomy suggested that post-human dimensions were being brought up. By resembling LED screens and accepting the stage lights with brightness, it was as if the characters were in a mimetic relationship with the background, belonging to a virtual space. Therefore, the light design was leading the acting, with the help of costumes, which were placing the actors «somewhere else». This was also possible to achieve due to the setting: it was a façade from a building, which gave enough room to the action space and established a scale relationship with the small characters. Plus, it was the façade of a church, adding some celestial connotations to the virtual existence. There were only a few props on stage that linked the characters to the real-life setting; a bench was connecting the characters to their mundane existence.

There was no co-creation or collaboration between the actors and the costume designer in this production, but costumes were used in advance to test the possibilities of the light design. All conceptual facets were discussed with the director alone and the experience was rather fruitful because the play exposed how much meaning can be added to a performance, when the visual solutions found for it meet the spirit of the time, being this a play based on very recent technological developments. The costumes had a significant narrative role in the realm of the production.

### 2.3 Costume Design for *Miss Fruits Go to School* Educational Project

*Donas Frutas Vão à Escola* (Miss Fruits Go to School) was a draft-project presented to Buzico! Produções Artísticas e Agenciamento Lda. (Lisbon, Portugal) destined to be implemented in primary schools to teach kids to eat more fruit. The director's demands, in this case, were the fruits being peeled, separated and cut, depending on the variety and, most important, with pieces that could be carried around by the child spectators. The banana had to be peeled, the grapes needed their seeds to be shown and the apple should have a slice cut out (Fig. 5).

The project itself had an apparent simplicity, but it was grounded on a few ergonomic topics to be sorted out regarding the users and also the spectators, who could take part in the narrative as collaborative actors – not to mention that the organic matter in the fruits could be correlated to the human body. Apart from peeling a fruit being also undressing in a certain extent, fruit and body alter with time, adding some elements to a possible improvisation in acting and possibilities in design. For example, the fruits being prone to change could lead to an apple oxidizing, making use of LED circuits linked to microprocessors and sensors to create that illusion of a slice being separated from its mother piece.

A few stories could be told, like a monkey eating banana or a caterpillar eating the apple. But what about the banana smell? Technical textiles could be used, adding smell via microcapsules of scent. Fabrics' textures could also add softness and cold or warm sensations to the surface of the fruits, such as velvet for a banana, canvas for an apple and organza for a grape. In other words, other sensorial elements would sum up to the visual elements, like smell and touch.



**Fig. 5.** *Miss Fruits Go to School* pre-project, presented to Buzico! Produções Artísticas e Agenciamento Lda. Costume design by Alexandra Cabral.

Mechanic features could be considered, such as magnets as seeds in a grape, to help close both halves when cut in two or to get the grapes connected back to the stem. Separating parts of the costume, peeling and unpeeling the fruits by means of velcro or zippers, moving around gracefully in costumes that could change the gravity center of the performer's body, all those facets could represent challenges in the performers' acting. On the other hand, giving the children's the chance to hold separate pieces from a costume would place them as performers telling a story backwards, while looking around for the original pieces of fruit.

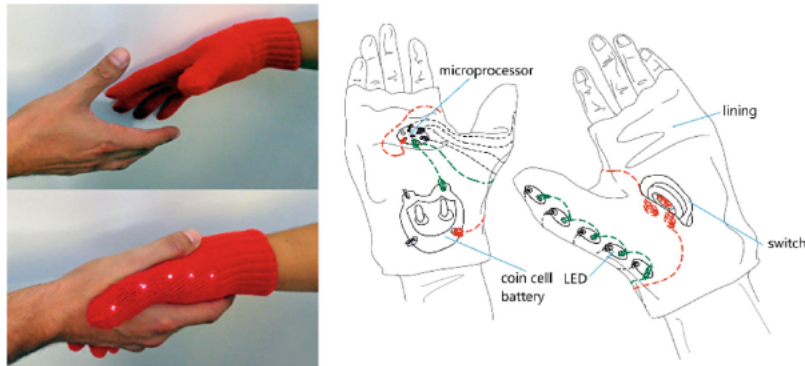
Sharing a costume with the spectator implies reviewing the staging process because it becomes a staging under construction. In this case, this would be particularly possible to be put into practice because the storytelling fruits summed up symbolic characteristics to their explanatory features, bordering somehow the possibilities of the narrative



to a few predictable topics, allowing the actors to expect, in advance, some reactions from the audience and be ready to deal with them on set.

#### 2.4 Glove Functional Prototype, E-Textiles Art Workshop at Contextile 2014

A simple functional prototype was developed during the E-Textiles Art Workshop held at the contemporary textile art biennale Contextile 2014 (Guimarães, Portugal), based on a few electronic tools: conductive thread, Lilypad Arduino, 5 LEDs, coin cell battery holder and lithium battery. The goal was to accomplish something functional in a very limited time, having to be inevitably small scaled. The challenge represented an introduction to designing with smart materials, hence it sounded appropriate to make an interface someone else could activate, generating an active behavior between sender and receiver. The solution should embody the emotion in a handshake, relating it to lighting up the LEDs in a glove. The limited resources led to a rational choice of where to place them: LEDs along the thumb; switch near it, where the other person's thumb touches; remaining electronic components hidden in the palm (Fig. 6).



**Fig. 6.** Glove functional prototype: switching the LEDs on with a handshake. Developed during the E-Textiles Art workshop at Contextile 2014 by Alexandra Cabral.

The prototype surprisingly provoked the urge in the opposite person to keep repeating the gesture of lighting up the glove. Into what extent lighting up the glove meant an immersive feeling into a handshake? The limited functions of the LED circuit proposed other possibilities, such as how to create more correspondence with the intensity of the gesture (harder, with more lights; softer with less), relating the prototype's expressiveness to human emotions in greetings. Colored LEDs could be added, and the electronic circuit could be spread to other parts of the body, accordingly to the desired symbolism.

The ergonomics in this prototype became both functional and cognitive, for being allied to a communicative gesture. What if both users had a glove with lights? What narratives could one compose with such wearables? Into what extend would acting and

improvising contribute to open up new possibilities? Chance and intentionality would bring new narratives to a handshake discourse, showing that technological wearables can drive us to explore storytelling.

### 3 Conclusion

A few performative contexts within the costume design process were analyzed, from including the actors' collaborations from the beginning to counting on the director's inputs only. Anyhow, costumes were used as tools of the staging creative process and proved to perform a significant role in conveying meanings to the audience through their direct relationship with the plot. Accordingly, they helped actors develop both a performative narrative and the characters themselves.

Consequently, questions were posed regarding the acting process about how costumes, by their nature, could either become the core of a narrative or bring possibilities for other stories to be told. The creative process was based on the potentials of the costumes' materiality and their ergonomic relationships with the body itself, considering also the new dimensions added by technological components. Those promoted a transformation of the dynamics of interaction among performers and between performers and spectators, capable of bringing new insights in a semiotic point of view.

Dynamic properties in costumes, such as detachable parts, moving parts, changing colors or lights, promote levels of interaction between the characters that inspire storytelling and lead to the rewriting of the stories themselves. Plus, costumes can become props perceived as new entities, either apart from the body or gaining meaning from it. They can have new «smart» characteristics and promote interactivity. Unpredictability is then a variable to consider, having the spectator the chance to switch roles with the performer.

Visually, costumes can convey certain aspects of the narrative by their plastic expression and provide some traces of personality to the characters they intend to dress. Acting adds soul to the characters, and costumes then contribute to the plot thread, guiding the spectator. Additionally, costumes also influence coordination and interaction among actors and establish their degree of embodiment into the scenic space. Textile materials are relevant for compelling, by their structure, certain body movements, formerly promoted by the costumes' shapes and textures; those features, together with their colors, transparencies or opacities, are prone to either allow them contrast or blend into the scenery, thus creating different meanings.

Designing costumes meets then the staging process. They merge in the intricate ergonomic task, both physical and cognitive, linked to drafting a narrative, narrowing down the results, providing the audience with a convincing recreated fictional world. It's a process obviously framed by an appropriate stage and light design that emphasizes storytelling, promoting the immersion of the spectators in the plot. All cases considered, a user-centered methodology becomes particularly important, not only in the costume design process but also in the process of assuring which aspects should be present and which should be disposable in the construction of a certain narrative, so that the story can be conveyed to the audience in a specific conceptual framework.



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