

‘Object Playing with Movement’: A Source of Comfort and Enjoyment

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Abstract: This paper presents three outcomes of research into bodily aspects of human-to-object interaction. The study is part of my quest for movement-based interaction for inducing emotion, focusing on clothing as an interactive object. The first outcome relates to the role the concept ‘movement’ plays in emotional interaction with objects, eliciting emotional properties in terms of how people hold and wrap their bodies in relation to the interaction. The second outcome relates to the unexplored conceptual space (i.e. personal and general space) where someone is comfortable with a particular ‘garment’. Finally, I report the exploration process of shape change - “Trans-Form-otion” as an interactive medium through prototyping in a design activity. Based on De Rivera’s theory of emotion and Gibson’s affordance theory, along with examples of current practice and studies of emotion-based clothing design, I analyse and critique the relevant design concepts and methods. The paper concludes by describing some outcomes of a design prototyping activity within the context of ‘object playing with movement’ treated as a source of comfort and enjoyment. This research contributes to the interactive design field and, through examples, shows how designers can incorporate behavioural concerns into their design process.

Key words: *Movement, emotion, interaction, meaning, clothing.*

1. Introduction

The concept of ‘movement’ is related to our experience of the physical world from our own anthropomorphic bodies. The way we understand objects around us is related to our bodily experiences arising from interaction with the spatial world [6, 10, 15]. In particular, Gibson [5, 6] suggested that the world unfolds itself as a potential for action. We perceive the world in relation to what we can do with it. Thus, the world is inherently meaningful for our body and by moving we can gain access to that meaning. Rodriguez [13] studied the relationship between the effects of emotion on behavior and industrial design. In particular, he considered the interaction between people and objects, ontologically, as a conversation and then as a reflection of emotion through movement and how behavior is connected to emotion. From a non-ontological perspective, he suggested that the behaviour a person engages in when interacting with a product may be seen as a *conversation* with the object.

The external aspect of movement focuses on the structure of the body and physical activity. The internal aspect of movement focuses on mental aspects and movements originating from ‘meanings’ as understood by an individual. It is assumed that product behavior can be enriched not only with physical movements for optimizing

the performance but also by mental enjoyment as a form of communication. The potential of this has been identified by Kyffin et al. [8] who states that

“Objects will play an important role as mediators. To take full advantage of the richness of human-object interaction and to use the potential of emotional interactions, there is a need for a new approach. It is worthwhile to explore adding behavioural expression to the existing movement possibilities. There is a need for new types of processes and tools to support the creation of the envisaged new product types. Product behaviour will be enriched with physical movements. Several possibilities exist: either the product is moving anyhow, or the movements are added just for the sake of communication. In both cases, the designer has considerable freedom to shape the movements and the interactions.”

Design and emotion or experience has consistently been an interest of designers working in the area of clothing design practice [1, 4, 11, 14]. The current practices and studies of emotion-based clothing practice involve diverging views. There are two significant approaches to investigating emotions in clothing design. Firstly, it is based on science-technology-enhanced aesthetics to stimulate an emotional response from the wearer [1, 11, 14]. A second approach is based on the concept of transformation to a dapt body movement to users' emotional requirements such as the transformation of furniture into dresses [2, 4, 7] and Möbius strip formed as infinite possibilities [7]. In particular, the boundaries between architecture and fashion have become increasingly blurred by transdisciplinary design approaches. For example, both disciplines are based on the human body and on ideas and theories of space, volume, and movement. Each functions as shelter or wrapping for the body—a mediating layer between the body and the environment—and can express personal, political, and cultural identity [2, 7]. In particular, women use fashion to communicate their feelings and beliefs [9]. For clothing, there are always integrated contributions from inner experience to the outer expression of our bodies. By adding body interaction to theories about clothing, clothing is converted into a three dimensional form with a functional, aesthetic sense and emotional interactions. Clothing becomes part of an in-between transitional space by the process of adding human interaction and its movement. It encompasses the psychological function through our emotional response to how we wear, how we feel and how we are perceived. Those things that are satisfied functionally and aesthetically should also be enjoyable.

This paper investigates theoretical aspects of the concept of movement, and the design approaches based on current emotion-based clothing practice indicate the significance of this way of understanding the particular role of ‘movement’ in human-object-emotional interaction in the field of emotional design research. In addition, movement serves as a resource for understanding and communicating how we feel and what we experience to develop clothing design, such as concepts like transformations to a dapt body movement to users' emotional requirements.

1.1 Aims and Research Questions

This research focuses on movement-based interaction for inducing emotion with clothing treated as a n interactive object. The aim of this research is to understand (1) the relationship of emotion and movement; in particular, our bodies and bodily aspects of clothing interactions and bodily action processes, (2) the way of

integration between movement and space and their communication with body, and (3) to develop design prototypes for wool garment design in terms of form and performance. This is under the concept of shape change-“Trans-for-Motion.” The research addresses the following questions:

- How the concept ‘movement’ is part of an objects’ emotional interaction?
- How people hold and wrap their bodies in relation to their interaction with an object?
- How action (body movement) and space are integrated, and how they are communicated using the body as an interactive object?
- How to use object (clothing) as a form of enjoyable expression?

2. Method

This research utilizes De Rivera’s theory of emotion [3] to understand human being’s relatedness to emotion and movement. This theoretical consideration is essential as a wellspring that provides insights to understanding as follows:

- The ways of understanding the ‘movement’ of our bodies and bodily aspects of interaction with clothing.
- The ways of integrating action (body movement) and space with body as an interactive object.

The theory of Gibson’s affordance [5, 6] is also used for the purpose of understanding the intrinsic material (i.e. wool) and substance or the unit segment to create potential form and the resultant form’s relationship with body and psychological movement in space (environment). This research also includes practice-based research on shape change-“Trans-For-Motion.” The “Trans-For-Motion” is based on investigating the bodily aspects of people’s interaction with clothing, adapted from De Rivera’s theory of emotion, to understand four basic emotional movements: “towards out,” “toward self,” “away from self (against other),” and “away from other”. In addition, “Trans-For-Motion” aims to blur the boundaries between clothing and accessories, between clothing and other forms of object. The usefulness of the concept of ‘movement’ through the case studies and theories are an essential and necessary part of conceptualisation within the design process for analyzing as follows:

- The way of people hold and wrap their bodies in relation to their interaction with garments.
- The way of people use an object (clothing) as a form of enjoyable expression.

3. The application De Rivera’s theory of emotion into wearing clothing activities

In this section, I describe how action (body movement) and emotion are integrated, and how they are communicated by focusing on clothing as an interactive object. There seems to be a closer relationship between emotion and movement, and not a linear continuation. Movement is a part of the expression of emotion, and not a simple reaction. Emotion emerges as potential movement implies a particular bodily orientate to the world [3].

As De Rivera remarked, citing Robbins [12], “the way of emotion is fundamentally a transformation of the human being’s relatedness to the world as being-with-others and alongside things. That is, emotion involves a movement within interpersonal, psychological, and lived space in such a way that how others matter is disclosed. Further, through his explication of emotion, De Rivera reveals how these interpersonal movements constitute emotion as a whole. In other words, he reveals, through his theory of the structure of emotion, how particular emotions can be understood as potential movement. That emotion emerges as ‘potential movement’ implies a

particular bodily orientation to the world. As De Rivera [3] argues, there exist four basic emotional movements: “Toward other,” “toward self,” “away from self (against other),” and “away from other.” Each of these movements of emotion corresponds to a bodily movement. In the case of “toward other”, the emotion corresponds to “positive extension”; “toward self” corresponds to “positive contraction”; “away from self” is embodied as “negative extension”, and “away from the other” is felt as “negative contraction.” For De Rivera, each of these movements relates to particular emotions; respectively, love, desire, anger, and fear. These can be understood as the felt bodily sense of emotion, which is felt directionality from the “potential movement” of a particular emotion. He analyzed that emotion does not simply reveal a two-directional orientation of closeness and remoteness; he also identifies the bodily-spatial dimensions of emotion as “extension” and “contraction.” For example, in love, I extend myself toward the other; that is, I move toward the loved object. With desire, on the contrary, I wish to bring the object toward myself, to possess it; thus, it involves contraction as a bringing towards.”

Using De Rivera’s four basic emotional movements: “towards out,” “toward self,” “away from self (against other),” and “away from other,” I applied his basic emotional movements into the activity of wearing clothes in order to understand how people hold and wrap their bodies in the context of emotion. When wearing clothing people use their clothing to wrap or hold their body for the purpose of a “protecting”, “self-expression” and even “hiding” reason. As shown the picture (Figure.1), she tried to close down her body with the garment toward the centre of her body, when she imagined a threatening person approach her. The emotion created can be associated with fear or threat. She tried to cover her body - in particular, her head, neck, and shoulder area is covered by the garment. Her upper body (head and torso) slowly bends towards the ground and her gaze also faces the ground along with crossed arms. I assumed that she wanted to escape the person’s notice. The space created by the inside zone of clothes can be referred to as the personal space, for this feels like a place to emotionally hold and protect (see more detail in p.5). This example can be related to De Rivera’s concept of feeling “negative contraction.” In other words, the way the garment is worn indicates that the body’s features were important emotional cues, such as the position of the trunk, head, arms, and degree of openness and closeness. Moving body also contained spatial features like degree of openness and closeness.



Figure. 1 manipulation of the garment, and the way the garment is worn in an insecure situation.



Figure. 2 manipulation of the garment, and the way the garment is worn in a pleasant situation.

Figure.2 shows how she manipulated the same garment on the body when she imagined meeting with close friends. The wrapping of her body and associated movement showed a more open and self-expressed reaction. In this sense, evoked emotion can be associated with a sensation of warm, relaxed emotional happiness and enjoyment. Revealing the head, neck and shoulder area, when manipulating this garment, seemed to be an important aspect of being comfortable and for self expression. Free arm movement also showed how limbs, like arms, can be used to express emotion. In addition, closing and opening arms and associated movements may create space in terms of personal and general space. For example, moving the arms creates a border for personal space against outer space. The whole space surrounding the outside of the clothes can be referred as general space. (see more detail in following section 2.2). Accordingly, body movement and its behavior in relationship to clothing showed the relation with people's expressive characteristics and their related bodily and emotional significance, which is referred in De Rivera's terms as "towards other" or "towards self. The movement of emotion corresponds to "positive extension" and to "positive contraction."

3.1 Body of being in –the-movement in Space

This section examines De Rivera's work on emotion and embodiment. This part focuses on how action (body movement) and space are integrated, and how they are communicated using the body as an interactive object. The body is considered as a tool for human intentions. Our physical body plays a central role in shaping human experience in the world, understanding of the world and interactions in the world. This aspect of aesthetics is related to the perceived quality of performed movements. The sense of movement is closely related to space.



Figure. 3 Creating personal and general space through closing and opening with body movement.

The author created the photographic images based on body, movement, sand, and shadow in *Extreme Edges* Pilot project with Maria Blaisse in Fremantle, Western Australia, 2009.

Figure 3 shows how the sense of movement is related to space and how perceptual space can be created through creating "closing" and "opening" body movements. As if she embraces sand, she slowly bends low to the sand, with her two legs moving outwards. In the following motion, with her right leg remaining curved, her curved left leg slowly stretches an opening towards the outside. The space created by the inside zone of shadow can be referred to as personal space, which embraces the sand as this feels like the place to emotionally hold and protect. In contrast, the whole space surrounding the outside of shadow (i.e., the environment in which the act of movement is viewed by other people and taking place) can be referred to as the general space. The performance using metaphor with shadow, movement, and space shows that our physical body plays a central role in shaping experience of movement in space. This choreography of interaction was created by the author, who participated

in a pilot project in the event “*Extreme Edges*,” held in Fremantle 2009. This was part of an educational program for Interior Architecture and Fashion and Textile Design students. The main aim was to experience *doing through unknowing* via the body, sand, and movement as an interactive medium. This experience of choreography started with the exploration of design practice under the concept of shape change “Trans-For-Motion.” The aim was to examine how people hold and wrap their bodies to create space (i.e. personal and general space) and how clothing can be manipulated by the wearer to create different volumes in those space.

3.2 Gibson’s theory of Affordances: how to transfer the concept of affordances to clothing design

Movement based interaction provides people with information about the world around us and ourselves. This basic principle is rooted in Gibson’s ecological theory of perception [6]. Gibson has suggested that the world unfolds itself in potential for action. We perceive the world in relation to what we can do with it. Thus, the world is inherently meaningful for our bodies and by moving we gain access to that meaning. From this theoretical perspective, Gibson [5, 6] introduced the psychological concept of ‘affordances,’ to our understanding of products, which suggests that products cannot be categorized through product names but rather through an intuitive bodily understanding of what people could do with them in their environment.

How can his theory adapt to do clothing design? Looking at everyday life it is evident that urban women around the world look to fashion to provide their emotional requirements and practical concerns in their more active, and non-male lifestyle where personal boundaries need to be clearly marked (i.e. commuting for air travel, working environment) [11]. They appreciate functionality in terms of performance, comfort or enjoyment. From this perspective, practical solutions in design based on transformation such as clothing transformed into furniture, luggage and even shelters. Designers of transformable fashions, like Hussein Chalayan, Miyake Issey [4, 7] found that experimentation with space and construction allowed them to refine and maximize the wardrobe beyond its wearable potential, as they transcended established boundaries and challenged conventions in fashion. In other words, it is important to understand how the function of clothing structure can be perceived by people in the interaction with this nature (i.e. clothing can be furniture in interaction with the way of using in space).

4. Design Prototyping Activities

This design practice is based on investigating the bodily aspects of human-to-object interaction, in shape change “Trans-For-Motion”-project.” Enjoyable object “Trans-For-Motion” is based on (1) Dasein De Rivera’s theory of emotion for the purpose of developing clothing design prototype in the relationship between movement and emotion, and (2) Gibson’s theory of affordance for the purpose of understanding the intrinsic material (i.e. wool) or substance, or the unit segment and potential form. “Trans-For-Motion” aims to blur the boundaries between clothing and accessories, between clothing and other forms of object, or between clothing and art. The prototyping process explores how people hold and wrap their bodies in relation to their interaction with a garment; how to use an object (clothing) as a form of enjoyable expression.

4.1 Design prototype: Trapping the WoolAir

Trapping the WoolAir is based on under the concept of shape change-“Trans-For-Motion.” It is a playful and enjoyable object, aiming to create feelings associated with comfort and enjoyment is composed of freedom,

relief, and security. The property of wool clothing that influences the level of comfort includes adjustability, aesthetics, and performance. The design process *Trapping the WoolAir* has started with an exploration of understanding innate wool properties within the structure of garments, such as resilience, durability, and versatility, combined with dematerialized design elements such as air and sense of touch at points of body contact. Different points of the body contact - the arm, leg, back, neck, head, and hand. This will influence the different levels of enjoyment or comfort. The prototype is designed to allow wearers to change the form, which interacts with movement and space and gives a feeling of enjoyment. In addition, the concept of *Trapping the WoolAir* is based on the idea of less matter but more experience, and less designing but more interaction with body and space. The basic idea was based on an uncompleted form, which can give more enjoyable and comfortable experiences to the wearer through movement and space. The form created is un-instructional and uncompleted. The form needs the wearers' body interaction, through the manipulating process, to give full of enjoyment. The form will be considered as completed until when the wearer feels comfortable in her body.

In the design prototype the clothing structure, *Trapping the WoolAir*, is composed of a substance or 'unit' which is a combination of matter and form and gives potential to its form and the transformation of form. The unit's modular segments are made out of wool felt, which traps air. Felt is a non-woven cloth that is produced by matting, condensing and pressing fibres. Some types of felt are very soft; others are tough enough to form a strong construction material. Felt can be made into any shape or size. The felt is used for the structure of *Trapping the WoolAir* because it is tough industrial felt, but still has a feeling softness due to being composed of wool merino from W.A. It also is an inherently inside-out and outside-in garment. When interacting with the body, the prototype creates continuous forms. When in space, the function of the prototype can be transformed into another form and function for adapting space. For example, a garment can be transformed into a cushion or a bag. The process of making the form is as follows:

- Take a regular square of felt.
- Split the felt from all the corners towards the centre forming a triangular flap.
- Fold the flap layer towards middle and sew corners together. Then repeat unit.
- 2D shape of layered felt is then transformed into 3D trapezoid shape naturally in trap of air inside.
- Transformed 3D trapezoid shapes can be interconnected to create a whole wardrobe which can be rearranged to transform one item into another.
- The unit modules can be renewed and styled can easily be reconfigured by interchanging the modules.

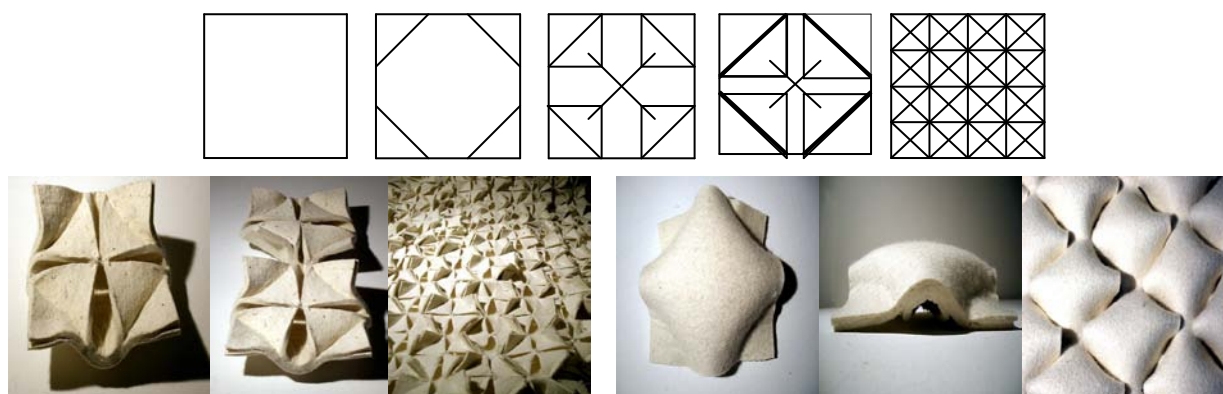


Figure. 4 *Trapping the WoolAir*: the process of making the form.

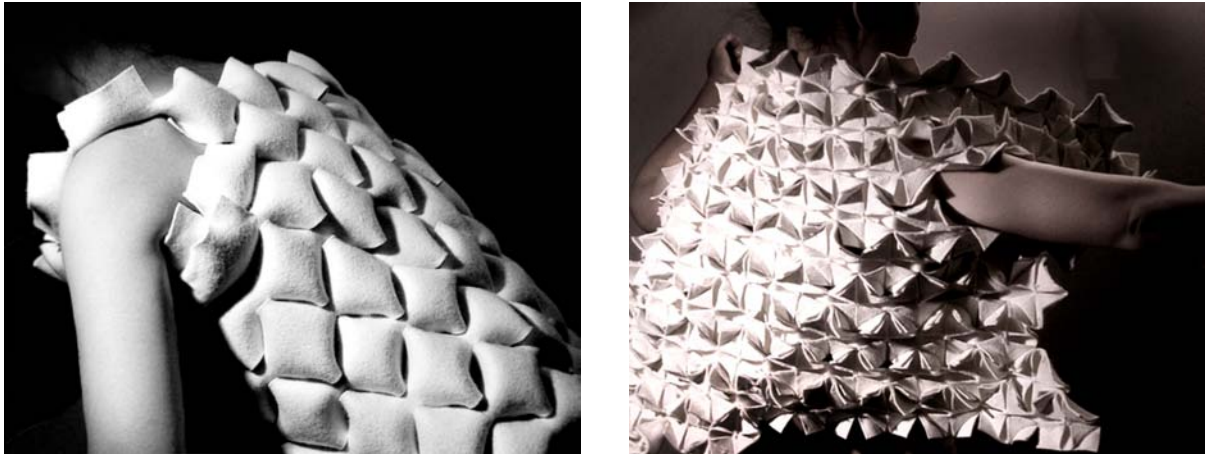


Figure. 5 Having different Inside and outside forms and functions with the garment and the un-instructional and uncompleted form, which can give more enjoyable and comfortable experiences to the wearer through the manipulating process.

Clothing can behave as a mediator of individual experience as a form of emotional aesthetics. *The Trapping the WoolAir* changes its aesthetics in accordance with inferred changes in emotional state, and is able to stimulate a myriad of responses. For example, the shape changeable 3D form may support the neck, shoulder, or back with the trapped air in between feeling like cushion shapes. Consequently, *Trapping the WoolAir* may actually help people to reduce body pain (discomfort) or protect the body from hazardous environments. Inside and outside have different forms and functions with clothes, enabling the creation of emotional feelings of holding, protecting, and self-expression. *Trapping the WoolAir* under the concept of shape change “Trans-For-Motion” is proposed as a tool to enhance and explore self-expression and self therapy. The idea of shape change “Trans For-Motion” can help people to accommodate the form for their body needs - for body movements and for adapting space. In other words, for the individual, this could be used as a form of self-therapy and aid in self-awareness. It can be used expressively by highlighting an emotional state so that behaviour can be adapted accordingly.

5. Result and Discussions

Movement serves as a resource for understanding and communicating about how we feel and what we experience. De Rivera’s theory of four basic emotional movements and Gibson’s affordances of psychological movement show how movement and emotion are dynamically congruent. This aspect of aesthetics is related to the perceived quality of performed movements, which is closely related to space. The case studies described indicate that movement is less a physiological activity and more about psychologically oriented emotional activity. The notion of ‘movement’ is an important element for clothing design. The usefulness of the concept of ‘movement’ is as an essential and necessary part of conceptualisation within the design process for analyzing (1) the way of people hold and wrap their bodies in relation to their interaction with garment, and (2) the way of people use an object (clothing) as a form of enjoyable expression. As demonstrated, the result of the subject’s manipulation of the garment and the way the garment is worn in an insecure situation or environment (i.e. facing a threatening person) showed she covered her body, in particular her head, neck, and shoulder area for the purpose of feeling emotionally held and protected. On the other hand, the way the garment is worn in a pleasant

situation or environment (i.e. meeting with friends) creates feelings associated with the sensation of warmth, and this relaxed emotional happiness and enjoyment was reflected in more openness and self-expression through body movements, such as revealing the head, neck and shoulder area, and free arm movements. This research indicates that body features were important cues as serving emotion, such as the position of the trunk, head, arms, and degree of openness and closedness. Movement of the body also contains spatial features, like degree of openness and closedness in terms of creating personal and general space. Consequently, body movement, and its behavior in relationship to clothing, showed the relationship with people's expressive characteristics and their related bodily and emotional significance. From emotion and movement theory, it is assumed that the body has its own kind of knowing - consciously or unconsciously - which may be tapped into for new levels of understanding and through the related manipulation of garments. From this theoretical consideration, design prototypes under the concept of shape change "Trans-For-Motion" were developed. This shows how a unit segment construction has the potential to make forms of clothing and how those garments can be used to transform from one into another when used interactively with body, movement, and space. More importantly, designing clothing prototypes based on the concept of uncompleted forms will provide people with enjoyable experiences when they manipulate them. The final form will not be completed until the wearer feels comfortable in her body. It can be seen as a form of self-expression and self therapy.

6. Conclusions

This paper has extended existing experimentation and exploration of design concepts and methods in conceptual clothing design through the use of design prototyping within the context of 'object playing with movement.' This investigates movement as a source of comfort and enjoyment and emphasizes the relationship of emotion and movement for clothing. It has also been important to consider how action (body movement) and space are integrated, and how they are communicated using the body as an interactive object. From a theoretical perspective, De Rivera's theory of four basic emotional movements and Gibson's affordances of psychological movement have provided a useful starting point for design prototyping. The research identified that there are always integrated contributions from inner experience to the outer expression of our bodies. By adding body interaction to theories about clothing, clothing is converted into a three-dimensional form with a functional, aesthetic sense, and so becomes a context for emotional interactions. Clothing becomes part of an in-between transitional space by the process of adding human interaction and associated movement. Design prototypes have been executed with the aim of stimulating emotional responses from the wearer. This was a process of shape change - "Trans-For-Motion" - as an interactive medium based on the concept of transformation where the aim is to adapt body movement to users' emotional requirements, such as the transformation of furniture into dresses and vice versa.

For future studies, further investigation into the qualities of movement will extend the research into the emotional aspects of the form and function of clothing. This research seeks to fill the knowledge gap between theory and practice. This research has highlighted the potential of design practice, as a trans-disciplinary design approach, in terms of the interrelatedness of design elements between creativity, space and clothing in relation to human behavior and spatial cognition. The aim was to provide insights into the concept of aesthetic comfort and enjoyment.

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8. References

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