

THE CLOTHING-PERSON RELATIONSHIP: COMPARATIVE ANALYSIS OF A STANDARD T-SHIRT ON A HEALTHY BODY AND ONE AFFECTED BY A NEURO-IMMUNE CONDITION WITH CLO3D

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Abstract: Clothing is more than a basic necessity; it plays a crucial role in self-perception, emotional wellbeing, and social interaction. This study explores the significance of functional clothing and digital garment simulation to highlight the essential role of functional clothing for individuals with neuro-immune conditions. Based on the concept of enclothed cognition, the research emphasizes how clothing influences psychological well-being, confidence, and social interaction. The main focus of this research paper is individuals with disabilities resulting from autoimmune neurological conditions, for whom clothing must not only be accessible and functional but also aesthetically empowering. Using CLO 3D simulation software as a central methodological tool, this research visualizes and compares the fit and comfort of garments on both healthy and minimally affected body types. By modifying the avatar to realistic postures, the authors were able to analyse garment behaviour under two physical conditions. The main tool used was the stress and tension mapping in CLO 3D, which revealed significant areas of discomfort—particularly around the neck and shoulders—in the affected body, underscoring the need for design adaptations. The findings reinforce the value of integrating userspecific needs into product development to improve autonomy, comfort, and emotional well-being through functional and inclusive fashion solutions to improve the quality of life for individuals with disabilities, ensuring that fashion is both functional and empowering.

Key words: Enclothed cognition, functional clothes, inclusivity, ergonomic design, comfort, Clo3D.

1. INTRODUCTION

The saying "When you look good, you feel good" perfectly encapsulates the deep connection between clothing and personal well-being. While it may seem like a simple statement, it highlights the significant role that garments, their form, and aesthetics play in shaping identity and overall psychological comfort. Clothing is far more than a superficial choice—it is a dynamic expression of self-perception and an influential factor in how individuals engage with the world around them [1].

Research in fashion psychology reveals that clothing is not just fabric draped over the body but an integral part of human experience, affecting emotions, behaviour, and even cognitive performance. Acting as a "second skin," what we wear can significantly impact our mood, confidence, and



state of mind. Studies further suggest that feeling comfortable in one's attire enhances focus and social interaction, reinforcing the concept of enclothed cognition—the idea that clothing influences cognitive processes and psychological states. Thus, beyond aesthetics, fashion becomes a reflection of personal aspirations, emotions, and identity, shaping not only how individuals see themselves but also how they are perceived by others [2].

For individuals with disabilities as an aftermath of an autoimmune neurological conditions, clothing takes on additional significance in terms of accessibility, autonomy, social perception, and emotional well-being. [2,3].

Functional clothing must not only be functional but also aesthetically pleasing, providing users with emotional comfort, self-esteem, and independence. Accessibility and ease of dressing is equally important, meaning garments should be easy to put on and take off, incorporating functional elements, ergonomic cuts, and minimal seams to prevent irritation. Mobility and adaptability must also be integrated into the design so that clothing allows freedom of movement and can be adjusted based on the wearer's physical condition. Beyond these functional aspects, the psychological impact of clothing should not be overlooked. Garments should be visually appealing, boost the wearer's confidence, and reduce the feeling of social exclusion [3,4].

2. THE CLOTHING-PERSON RELATIONSHIP

In recent years, the fashion industry has begun to address the needs of individuals with disabilities and chronic conditions by offering adaptive clothing that combines comfort with accessibility. Although there is still a long way to go, some brands have made significant progress in creating garments that meet the requirements of diverse user groups.



Fig. 1: The Development Process of a Functional Product [5]

The four stages illustrated in *Fig. 1* are interdependent, contributing to an improved quality of life and enhanced comfort for individuals with neuro-immune conditions.

The first stage involves identifying the wearer's needs through a detailed analysis of specific requirements, such as temperature sensitivity, limited mobility, or the necessity of integrating func-



tional medical devices. Based on this analysis, garment requirements are defined, including the selection of suitable materials and textile properties that contribute to creating a functional product.[1]

The next stage is prototyping and testing, where information from the previous phases is combined to develop and refine a prototype with the benefit of user feedback. Based on this input, the product is optimized so that, in the final stage, it can be tested under real-life conditions to determine its effectiveness in daily use. The product evaluation phase includes an analysis of key indicators, such as the comfort provided and its impact on the user's quality of life.[1]

By properly integrating these stages, functional clothing becomes an essential tool for managing symptoms of neuro-autoimmune diseases, increasing user independence, reducing physical and emotional discomfort, monitoring and preventing symptom aggravation, and improving selfesteem and overall well-being. Thus, functional clothing is not just a necessity but also an innovative and personalized solution designed to significantly enhance the lives of individuals with neuroautoimmune conditions.[1]

3. A VISUAL ANALYSIS OF FIT AND COMFORT

3.1. Method

To facilitate realistic avatar postures within the CLO 3D simulation environment, the pose of the avatar can be modified by manipulating the skeletal joints using two kinematic systems: Forward Kinematics (FK) – each joint is moved individually to control the avatar's pose manually. and Inverse Kinematics (IK) - where moving one joint automatically adjusts the connected joints to create a natural, realistic pose. [6]

The joint structure of the avatar must first be made visible in the 3D workspace. This is accomplished by selecting the avatar and enabling the Show Avatar Joints option within the Avatar Display menu. [6]



Fig. 2: Scheme of the skeletal joints of the avatar in Clo3D [6]

3.2. Practical use

To further illustrate and analyse the importance of these functional clothing products and to present a visual representation of the clothing-person relationship, a simulation was conducted. This



simulation compares a healthy body with a body affected by a neuro-immune condition at its mildest level based on the public available information, both wearing the same clothing piece. [6,7,8]

Both the healthy and neuro-immune affected body prototypes were generated using CLO 3D, following the procedure described in Section 3.1. All default body parameters provided by the system were retained, except for the avatar height, which was adjusted to 170 cm.



Fig. 3: Side-by side comparison of a healthy body with a body affected by a neuro-immune condition at its mildest level a) healthy body; b) affected body.

By analysing *Fig. 3*, the visible differences in posture and arm positioning can be observed in the affected body. All these differences dictate the how clothing fits and interacts with the body. To explore this further, the same clothing item—a short-sleeved t-shirt—was simulated on both body types.

To be able to appreciate how the t-shirt sits on the body, in the soft CLO3D the function of transparency was used to clearly see the lines of the body and the lines of the clothes and how they interact with each other.



a) &b) healthy body c) &d) affected body

Based on the results obtained in Fig 4 in image c) and d) that are the avatar with the affected body, we can see an area that may indicate some kind of tension and disconfirm around the neck-



shoulders area. To further assure ourselves that this tension is present, we switched from the transparency function to the tension and stress map and got the following results:



Fig 5. Tension mapping of the clothing on the affected body.

The results obtained in Fig 5 using stress-mapping functions in CLO3D reveals areas of tension, particularly around the neck and shoulders, confirming the need for a functional and adapted garment to be able to accommodate the physical variations present in individuals with neuroimmune conditions.

5. CONCLUSIONS

This research highlights the vital importance of functional clothing for individuals with neuro-immune conditions, where even mild physical changes can significantly affect garment fit and comfort. Through the use of CLO 3D simulation software, the study examined how a standard garment interacts with both healthy and minimally affected body types. The simulation revealed visible differences in posture and garment behaviour, with stress mapping indicating discomfort particularly around the neck and shoulders—in the affected body. These findings highlight the necessity of designing clothing that not only accommodates physical variations but also enhances emotional well-being and social inclusion. By demonstrating that discomfort can arise even in cases of mild physical deformation, the study reinforces the need for inclusive, personalized clothing solutions at every stage of a condition. Ultimately, this research advocates for a user-centred approach in fashion design, where function and aesthetics are equally prioritized to promote autonomy, confidence, and quality of life for individuals with disabilities.

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