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THE INTERPLAY OF FORM, FUNCTION AND PERCEPTION: TECHNOLOGICAL AND VISUAL ASSESSMENTS OF HUNGARIAN MILITARY FIELD UNIFORMS

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Abstract: The development of modern military uniforms is a complex task integrating material–structural innovation, thermophysiological performance and multispectral visual detectability. This study examined the material composition and visual–technological characteristics of three Hungarian field uniforms (65M, 2004M and 15M) from a perceptual perspective, involving fashion designers (N=10), soldiers (N=20) and civilians (N=20). Questionnaire–based data collection employed Likert scales, multiple–choice items and qualitative assessments; participants evaluated the perceived advancement of texture, pattern and camouflage technology, as well as the integration of form and function. Findings indicate that durability, comfort and thermal–moisture regulation constitute the strongest material expectations, whereas digital patterning and matte surfaces emerged as the key visual indicators of a high–tech appearance. The 65M uniform was perceived as outdated, the 15M appeared more professional and conveyed a stronger sense of safety. Soldiers distinguished most clearly between actual functional performance and the perceived visual sophistication of the garments. Qualitative responses identified priorities for future development, including smart textiles, active thermoregulation systems, abrasion–resistant composites and multispectral camouflage materials. The study suggests that the effectiveness of military uniforms is shaped jointly by physical performance and perceptual–technological visual character, underscoring the need for integrated, interdisciplinary design approaches.
Keywords: military uniform design, perceptual engineering, technical textiles, camouflage

1. INTRODUCTION

The history of military uniforms can be traced back to the first regular armies. In antiquity, most civilizations inhabiting the Mediterranean basin (Egypt, the Greek poleis, Persia and Rome) maintained organised armed forces, where the earliest regular garments served defensive purposes through leather, bronze and iron-based armour [1]. Following medieval metal armour, the form of the military uniform familiar today emerged in Europe by the late seventeenth century. During the Thirty Years' War, in 1632, Gustavus Adolphus of Sweden introduced distinguishing colours for his units for reasons of recognisability and tactical coordination, enabling soldiers to be more easily identified on the battlefield. This marked the appearance of later uniform colours, including blue, yellow and green regiments [1]. Over the next four centuries, military attire remained vividly coloured so that opposing forces could be readily distinguished. However, the technological transformations of the twentieth century reshaped both material use and colour strategies.

Driven by two world wars and later Cold War proxy conflicts, the twentieth century centred on advancements in military technology. Accordingly, the examination of uniforms from a technological viewpoint gained increasing relevance. In modern warfare, clothing functions as an active, complex technological system in which materials science, ergonomics, thermophysiology and visual communication each hold strategic importance [2]. Today, the development of military equipment represents one of the most innovative domains of the textile industry.

This research follows changes in the material use and appearance of military uniforms over recent decades and investigates how these developments are perceived by groups with different professional backgrounds (civilians, soldiers and design experts). The visual-technological analysis interprets the technical and cognitive implications of material innovation jointly. The study's interdisciplinary approach is reinforced by the necessity of collaboration among materials engineers, polymer chemists, ergonomic specialists and designers to achieve genuinely innovative solutions. Only through such integration can modern uniforms meet contemporary protective, comfort-related and tactical requirements [3].

2. THE TECHNICAL DIMENSION OF PERCEPTION

Perceptual engineering examines how individuals sense and evaluate technological properties such as material texture, light reflectance or changes in visual complexity. According to Wang et al., surface quality, colour tone and material structure strongly influence observers' judgements [4], forming a key foundation for the present study. Uniforms also function as symbolic communicative media capable of eliciting emotional responses from observers [5]. Research indicates that the style, colour and structure of uniforms significantly affect perceptions of professionalism, trustworthiness or intimidation, meaning that their visual character can convey competence, authority and expertise [6].

Pattern plays a central role in this process. Historically, uniform colour symbolised belonging to a unit rather than individuality [1]. With the rise of camouflage, the assessment of colour schemes became increasingly important. Wang et al.'s colour-scheme study [4], using eye-tracking technology, demonstrated that fixation time, number of fixation points and time to first fixation differ significantly between camouflage patterns. This suggests that the perceptual process distinguishes "less professional" from "high-tech" appearances within moments.

Visilenau et al. [7] report that in the 860–1200 nm wavelength range, solid-colour surfaces show uniform reflectance, whereas camouflage patterns display variable reflection. Complementing this, Dobrozhan et al. [8] note that surface roughness and texture influence light scattering and absorption, directly affecting infrared detectability. These factors are crucial, as the surface properties of military uniforms are designed to enhance camouflage.

Here, the protective function aligns with observers' perceptions: matte surfaces, beyond their reduced reflectance (thus greater tactical safety), appear "more professional" and "more modern" to viewers. Zheng et al. [9] argue that this perceptual effect is particularly important in military contexts, where reduced visibility is a tactical advantage.

3. ADVANCES IN MATERIAL TECHNOLOGY AND VISIBILITY

The earliest military uniforms were made from natural fibres. In the early twentieth century, wool, cotton and linen fabrics dominated, providing comfort and pleasant tactile qualities but limited protective capability [10]. The Second World War initiated a major paradigm shift with the introduction of synthetic polymers such as nylon and later polyester. Nylon revolutionised the textile industry in the 1940s as the first synthetic fibre with excellent mechanical properties, while subsequent polyester developments further improved durability and drying speed [11].

From the 1970s onwards, aramid fibres (Kevlar, Nomex) transformed military protective clothing. These aramid materials exhibit outstanding heat and flame resistance [12], while the liquid-crystal polymer (LCP) fibre Vectran offers exceptional tensile strength [13].

The present-day military uniforms are multifunctional composites that simultaneously provide ballistic protection, flame resistance, moisture management and comfort [14]. Their fundamental functional requirements include:

- Light weight, as it reduces the soldier's physical load.
- Thermal comfort, since vapour permeability and thermal conductivity regulate body temperature [15]. Thermophysiological comfort therefore refers to the regulation of heat and moisture. Multilayer fabric structures significantly improve thermophysiological performance. For instance, the combination of a bamboo outer layer and a microfibre polyester inner layer offers excellent moisture management and air permeability [16]. The components are:
  - Air permeability: High breathability supports body temperature regulation. Cotton-based fabrics exhibit air permeability values of 139.85–159.58 $cc/s/cm^2$, whereas polyester components reduce these values [17].
  - Water vapour permeability: The evaporation of sweat is crucial for reducing the humidity of the microclimate. Lyocell and bamboo fibres possess outstanding vapour transmission properties [18].
  - Thermal conductivity: Nano-filament polyester fibres demonstrate lower thermal conductivity than cotton, producing a cooler sensation [19].
- Water resistance and fast drying, as water-repellent coatings (hydrophobic surfaces) and quick-drying fibres (Coolmax, Thermolite) support comfort and mobility.
- Abrasion and tear resistance: Aramid and UHMWPE fibres provide high mechanical strength. Nomex, a meta-aramid fibre with inherent flame resistance, decomposes at 370–430°C and consolidates under intense heat, preventing burn injuries to the skin [12]. The most critical aspect of military clothing is ballistic protection; in this respect, ultrahigh molecular weight polyethylene (UHMWPE) fibres offer excellent strength-to-weight ratio and tensile capacity [20]. Materials with a negative Poisson's ratio (auxetic materials, which widen when stretched) provide enhanced energy absorption and impact resistance [21].

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Developments increasingly move towards intelligent textile systems [22]. The application of nanotechnology is already significant: nanoparticles (silver, copper) provide antimicrobial properties that reduce odour formation and improve hygiene over prolonged use [23]. Graphene-based coatings additionally offer electromagnetic interference (EMI) shielding, a capability highly relevant in modern warfare [24].

Alongside physical performance, camouflage technology has undergone substantial advancement. The emergence of digital camouflage patterns represents a life-saving innovation. According to Donrozhan et al., woodland, digital pixel and multicam designs reduce detectability not only in the visual domain but also across the infrared spectrum [8]. The MM-14 pattern employs lighter greyish-green tones that reduce infrared reflection, whereas the high-contrast dark/light elements of woodland are more effective in environments with stronger thermal variation.

Park et al. [25] highlight that the newest developments involve multispectral camouflage materials providing simultaneous visual, infrared and radar concealment. Their specialised metamaterials manipulate electromagnetic waves, rendering uniforms “invisible” across multiple detection spectra [26], [27].

Human perception does not reduce to a single sensory channel. Wilfling et al. [28] argue that vision, touch and thermal sensation collectively shape the evaluation of military uniforms. Sensory weighting also varies by gender. Wilfling et al.’s research on sportswear [29] shows that women place greater emphasis on tactile properties, whereas men prioritise thermophysiological comfort; an aspect Islam, Golovin and Golez [30] identify as the most critical factor in military material selection.

Regarding tactile perception, studies employing event-related potential (ERP) methods [31] show that the somatosensory cortex responds specifically to the mechanical properties of different fabrics. Yuan, Fang and Lu demonstrate that soldiers’ brains process material characteristics within the first 100 milliseconds, influencing subsequent comfort perception and psychological state.

4. HUNGARIAN MILITARY UNIFORMS

Hungarian military attire took shape in the second half of the eighteenth century under Turkish and South Slavic influence. Infantry regiments of the Imperial-Royal Army wore braided, tight-fitting trousers, and jackets with ornamental braiding on the sleeves, introduced by Maria Theresa to prevent soldiers from wiping their noses on their cuffs. In 1848, a longer atilla-style uniform with sparser braiding emerged as a symbol of Hungarian liberty. In the early twentieth century, the army of the Austro-Hungarian Monarchy adopted first a steel-grey, then in 1915 a field-grey uniform. After the First World War came khaki designs, while the Second World War fundamentally simplified soldiers’ appearance. In the post-war period, camouflage briefly receded as woollen cloth became the primary material, yet the 1949 shift to Soviet-style uniforms once again overrode previous developments [32].

In 1965, one of the most iconic garments in the history of Hungarian military uniforms appeared: the 1965M field uniform. The designers sought to incorporate Hungarian military traditions while ensuring that the materials required for production could be manufactured domestically [33]. This led to the creation of a cotton canvas fabric—initially khaki, later olive green—modelled on the OG-107 uniform used by the United States Armed Forces (with some Cuban inspiration). The new field uniform was introduced as a cross-branch standard and remained in service until the abolition of conscription in 2004.

Due to its high abrasion resistance and its use of a 300 g/m², 100% cotton fabric, the uniform, with two side pockets, one utility pocket and two back pockets, is still regarded as durable and comfortable. A thigh pocket on the right leg was designed to hold a four-piece stainless-steel cutlery set. Military surplus retailers note that its robustness has made it a popular work garment, and it is also favoured by hunters, anglers and hikers. For winter, the uniform was accompanied by a three-quarter-length field coat. Its quilted lining with faux-fur collar was removable, allowing soldiers to wear only the outer canvas layer during autumn and spring. (The earlier 61M padded uniform was one-piece; its discomfort was resolved by the 65M design.) There was no separate summer uniform, though soldiers were permitted to wear the field shirt without the jacket, with rolled-up sleeves. The system did not differentiate between service branches in terms of colours, and branch insignia were worn only by professional soldiers.

According to the Institute of Military History [33], the 1965M uniform met both the requirements of the Hungarian People’s Army and the technological standards of its era. It was comfortable, mass-producible and functional for a conscript-based army. Minor modifications were introduced over the decades, including the standardisation of officers' and NCOs' pocket designs, the simplification of pocket flaps, and the removal of the detachable side panels on the field cap after 1975. These adjustments were driven by cost-efficiency considerations. Faded or worn uniforms were frequently re-dyed for the same reason, though with limited success.

The 2000M field uniform emerged around the turn of the millennium. It featured a three-colour printed camouflage pattern and was made from a lighter, more breathable ripstop fabric, which offered greater comfort than earlier uniforms; however, the material proved insufficiently durable [34], as neither the jacket nor the trousers included additional reinforcement layers where needed. The jacket had two concealed-button pockets, while the trousers featured two front pockets and two cargo pockets, with no back pocket.

The 2004M uniform adopted a desert colour palette and incorporated numerous American design elements, as its cut was based on the U.S. BDU, and even the buttons matched American specifications [35]. A distinctly Hungarian characteristic was the production of two versions—one heavier, one lighter—to accommodate climatic differences [36]. Oversized belt loops, twice the size of those on the original BDU, reflected Hungarian military practice. Two side-opening pockets were sewn beneath the belt line, and the fastening was concealed. The large accordion-style cargo pockets offered better storage capacity than earlier designs, though the pocket intended for storing the stainless-steel field cutlery set was omitted. The trouser legs featured strong elasticated cuffs to allow them to be pulled over boots. Both the knees and seat were reinforced with double layers of fabric. Stitching quality was high across both the trousers and jacket.

The uniform, sewn in Hungary from American-made fabric, was initially produced with an American camouflage pattern, later replaced by the 90M desert variant (introduced around the political transition, with several known versions). Thus, the 2004M fundamentally followed the U.S. BDU pattern while retaining some recognisable Hungarian features. The desert uniform was produced in two versions optimised for colder and warmer weather, differing primarily in fabric weight.

The next step was the introduction of the 15M uniform, designed to meet the digital-age requirements of the twenty-first century. Following material developments across NATO armed forces, the uniform incorporated 64% Lenzing FR (flame-retardant viscose), 24% para-aramid, 10% polyamide and 2% antistatic fibres. (The training uniform composition differs: 65% cotton and 35% polyester.) The new blended ripstop textile (with an areal density of 210 g/m^2) is breathable and absorbent, offers high tensile strength (900/800 N for 50 × 200 mm specimens), abrasion resistance (≥ 3500 cycles), colour fastness (grade 5) and, due to the antistatic component, prevents electrostatic charge build-up and spark formation [37]. (The training uniform performs less well but remains acceptable.)

The operational uniform's material composition ensures good air permeability and oil repellence, and meets infrared reflectance requirements [37] [38]. The ripstop weave further enhances durability. According to Mészáros [39], the uniform resulted from several years of development, though its design originated abroad rather than domestically. Ultimately, the goal was to meet the military challenges of the twenty-first century, a goal achieved, according to Defence Minister Kristóf Szalay-Bodrovniczky in a 2024 address, as part of the Digital Soldier Programme. This initiative encompasses the renewal of all personal, tactical and individual communication equipment within the Hungarian Defence Forces, departing from the earlier practice of procuring equipment unchanged over decades.

5. EVALUATING MATERIAL SELECTION AND TECHNOLOGICAL SOPHISTICATION

The literature demonstrates that the development of modern military uniforms is both a technological and a perceptual process. Advances in materials science have significantly expanded uniform functionality, while the impression conveyed to observers has become equally important. The reflectance properties of material surfaces, the spectral behaviour of camouflage patterns, the distinctive textures of composite materials and the visual complexity of digital designs all contribute to military appearance and its environmental, tactical and communicative expectations.

Research shows that the visual evaluation of military uniforms is formed within the first seconds, substantially influencing perceptions of the wearer's professionalism and tactical competence [6]. Eye-tracking studies by Wang, Song, Liu, Li and Zhang [40] demonstrated that different camouflage patterns produce distinct fixation patterns among observers, directly affecting perceived professionalism and modernity. Their findings highlight the relationship between visual camouflage and perception, indicating that the development of effective camouflage schemes must incorporate the measurement of psychological responses.

This perceptual dimension is further elaborated by Visileanu et al. [7], who argue that infrared reflectance and surface roughness are likewise perceptual factors. Their analysis focused on the statistical distributions of reflectance within the 860–1200 nm wavelength range. Matte and more textured surfaces are typically perceived as more advanced and tactically suitable, irrespective of their actual physical performance. This effect relates closely to the perception of "high-tech" appearance, wherein less glossy materials are interpreted as signalling a higher degree of technological sophistication. Contemporary military uniforms thus function as complex visual media, simultaneously communicating competence, authority, advancement and professionalism [41]. These visual messages play a crucial role in (re)constructing the identity of uniformed services [5].

This theoretical framework justifies examining how groups with different backgrounds (fashion designers, professional soldiers and civilians) perceive material selection, technological sophistication and visual character in military uniforms. Perceptual engineering suggests that semantic judgements (e.g. "modern", "safe", "durable") often diverge from the objective material properties, making it relevant to explore how civilian and expert viewpoints differ and which features shape the evaluations of various user groups.

The present small-scale exploratory questionnaire study investigates the opinions of these three groups. Its aim is to map perceptions of material use, technological innovation and visual energy patterns (patterning, texture, colour composition). Comparing the Hungarian 65M, 2004M and 15M field uniforms within the survey enables participants to assess differences between eras not only in abstract terms but on the basis of concrete visual stimuli. The resulting findings align well with material science, ergonomics and perceptual theory, demonstrating the extent to which visual technological sophistication can be inferred from image-based impressions alone.

The aim of the research was therefore to explore:

- how fashion designers, soldiers and civilians evaluate the material selection and technological sophistication of modern military uniforms;
- which material properties are considered most important across the three examined groups;
- the extent to which participants perceive technological advancement on the basis of visual appearance;
- what visual impressions are created by Hungarian uniforms from different eras (65M–2004M–15M);
- and how integrated the relationship between form and function appears to observers.

The questionnaire was prepared in three separate versions, each following the same thematic structure. Ten Hungarian fashion designers, twenty professional or former soldiers and twenty civilians completed the survey. The differentiated professional background of the sample made it possible to compare the aesthetic-technological perspectives of designers, the functional-tactical perspectives of soldiers and the perceptual-emotional perspectives of civilians.

The three questionnaires consisted of several blocks, including Likert-scale items (importance of technological sophistication, perceived advancement of modern uniforms, form-function integration, suitability for extreme environments according to soldiers, and perceived technological progress on a scale from 1 to 5); multiple-choice questions regarding expected material properties; and open-ended questions on the aesthetic and functional impact of textile innovation and the developments required in the future. Additionally, the civilian group received an image-based decision task: using three uniforms displayed on neutral mannequins in identical poses, they were asked to determine which of the three unnamed garments appeared most modern, which conveyed safety, and which seemed most suitable for military use. The images represented the 2004M, 65M and 15M uniforms, presented in this order to avoid implying a chronological sequence.

Quantitative data were evaluated through percentage distributions and mean calculations, while open-ended responses were analysed via thematic qualitative coding. Comparisons were subsequently made across the three participant groups.

The first point of evaluation is that all three groups regarded the technological sophistication of material selection as highly important. All groups agreed that advancements in material technology are fundamental. One hundred per cent of fashion designers, 70 per cent of soldiers

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and 75 per cent of civilians awarded the highest score on the five-point scale (Figure 1). This aligns with extensive literature indicating that in modern warfare textiles have become multifunctional systems (for instance in relation to thermoregulation, IR reflectance or flame resistance).

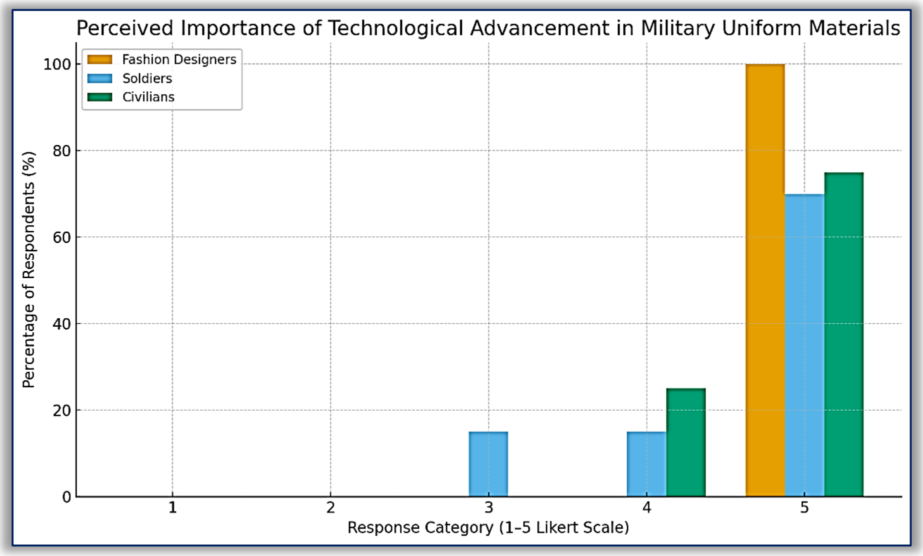

Figure 1: Perceived Importance of Technological Advancement in Military Uniform Materials

The responses to the question of which material properties are considered most important in military uniforms again revealed strong parallels across the three groups. Among the selectable variables (light weight, durability, heat and moisture resistance, camouflage technology, comfort/ergonomics and "other"), fashion designers regarded all as essential design requirements. According to Léber Barbara [42], designer of the most recent yet not-yet-produced Hungarian uniform, each of these criteria is technically achievable, and no competent designer can afford to overlook them; ideally, with well-executed design, all can be met simultaneously.

Durability was emphasised by both soldiers and civilians at a rate of 100 per cent. This aligns with the findings of Romvári [37] and Wilfling et al. [29], which underscore the importance of tensile strength, abrasion resistance and ripstop constructions, as well as the direct psychological influence that material feel and thermophysiological comfort exert on the wearer. Across the remaining variables, soldiers exhibited the greatest variation in opinion and were the only group to suggest additional factors—such as body-heat concealment and water resistance. Overall, 70 per cent of soldiers considered light weight, camouflage technology and comfort essential, while fewer than half prioritised heat and moisture resistance.

For civilians, the first three criteria were endorsed by 100 per cent of respondents, whereas the latter two were considered important by 75 per cent (Figure 2).

Expected Material Properties of Modern Military Uniforms			
	Fashion Designers (N=10)	Soldiers (N=20)	Civilians (N=20)
Lightweight	10 (100%)	14 (70%)	15 (75%)
Durability	10 (100%)	20 (100%)	20 (100%)
Thermal & Moisture Resistance	10 (100%)	9 (45%)	20 (100%)
Camouflage Technology	10 (100%)	14 (70%)	15 (75%)
Comfort / Ergonomics	10 (100%)	14 (70%)	20 (100%)
Other	0 (0%)	3 (15%)	0 (0%)

Figure 2: Expected Material Properties of Modern Military Uniforms

The third question (Figure 3) addressed the perceived technological sophistication of modern military clothing. Here, half of the fashion designers selected the highest rating, whereas none of the soldiers evaluated the uniforms this positively (55 per cent chose a score of 3, and 45 per cent a score of 4). Among civilians, 75 per cent also selected the top rating, reflecting the principle of perceptual engineering that the visual impression of high-tech design does not always align with actual physical performance.

Civilians and fashion designers tend to perceive a technological leap primarily through the use of new materials and the incorporation of bolder design lines [42]. The visual impact of digital patterning, matte textures and contemporary tailoring, however, does not influence soldiers to

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the same extent; they remain attentive to factors such as garment longevity and real-world performance under operational stress.

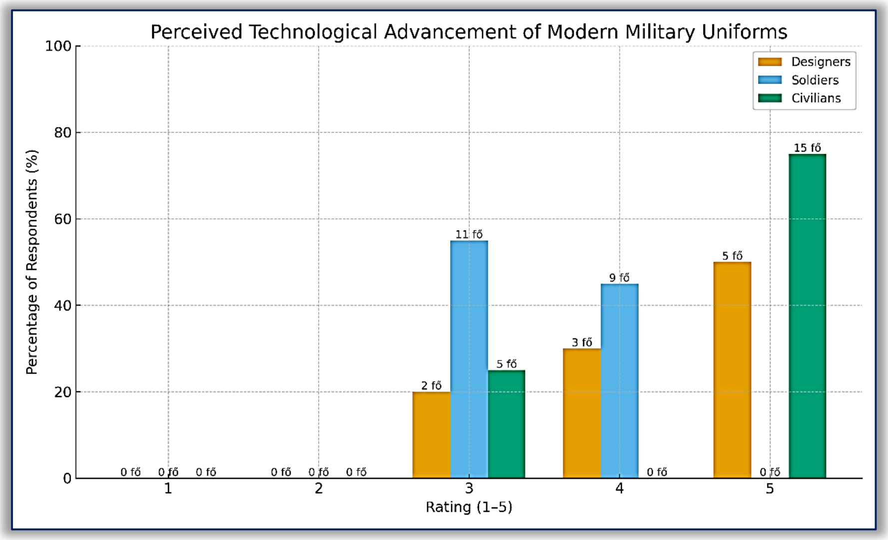

Figure 3: Perceived Technological Advancement of Modern Military Uniforms

This question included an additional item posed specifically to civilians, examining the visual impressions generated by the uniforms (Figures 4 and 5). Respondents were shown images of the 65M, 2004M and 15M uniforms on neutral mannequins, without being informed of their names or chronological order. In terms of perceived modernity and professionalism, none of the participants selected the 65M, indicating that it is visually ineffective in a contemporary context. Half of the respondents judged the 2004M to be more modern and professional, while the other half selected the 15M.

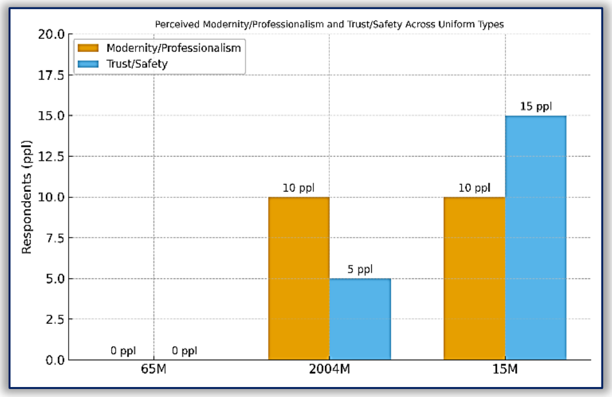

Figure 4: Percieved Modernity/Professionalism and Trust/Safety Across Uniform Types

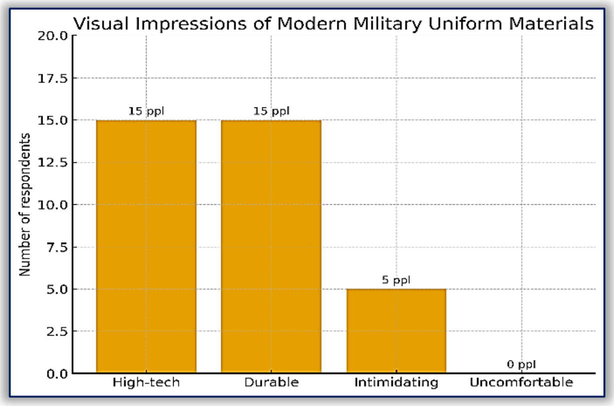

Figure 5: Visual Impressions of Modern Uniform Materials

Regarding the impression of safety, however, the 15M was the clear winner: 75 per cent of respondents chose this uniform, and it likewise received 75 per cent for conveying a high-tech appearance and perceived durability. These results indicate that the 15M consistently acquires the attributes of "safety, modernity and reliability", which aligns with the notion that digital patterns visually emphasise technological character.

Interestingly, only one quarter of respondents considered authority an important criterion, which corresponds with U.S. Army guidelines [43] stating that a uniform should primarily project safety to the civilian population. Overall, the findings support the conclusion that the combination of digital patterning and matte texture is perceived as technology-focused and thus conveys a sense of "advancement".

The question examining the impact of design on soldiers (Figure 6) assessed the perceived relationship between design and functional performance. Eighty per cent of soldiers felt that design changes only moderately support requirements such as mobility, ventilation or protection. Among the specific critical remarks were concerns about inconsistent material quality (notably in the case of the 2004M) and insufficient improvement in ventilation. These observations indicate

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that professional soldiers prioritise functionality over appearance; design enhancements alone are insufficient if not accompanied by corresponding improvements in material quality.

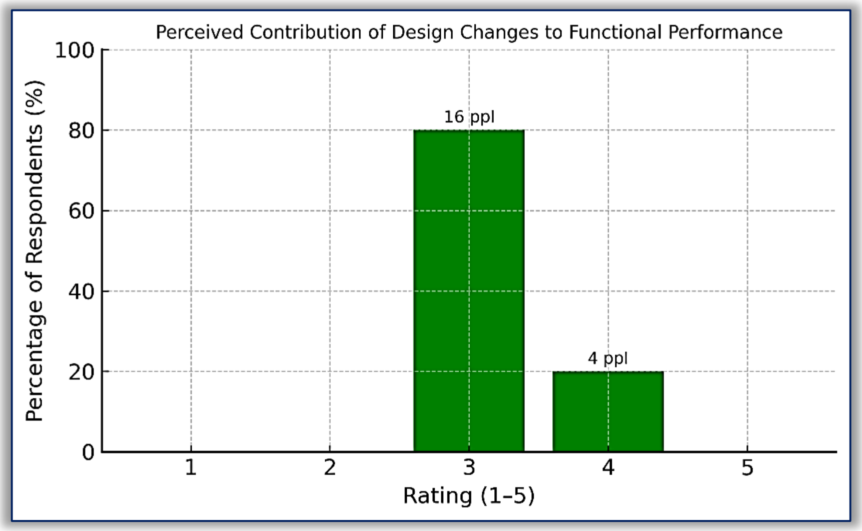

Figure 6: Perceived Contribution of Design Changes to Functional Performance

Regarding future technological developments, fashion designers highlighted the growing importance of smart textiles and materials that enhance comfort, emphasising the fusion of aesthetics and practicality. One respondent noted that new materials also introduce new visual identities. Several soldiers suggested that outerwear could benefit from adopting heated inserts already used in ski jackets, emphasising the need to conceal body heat and to further increase durability. One soldier predicted that, apart from garment cut, virtually every aspect of military uniforms will change in the future.

6. SUMMARY

The findings of the study confirm the theoretical relationships outlined in the literature. The evaluation of military uniforms is shaped simultaneously by the physical performance of the material and the visual-perceptual experience it conveys. Although the three participant groups approached the subject from different perspectives, several key points emerged consistently: technological sophistication is highly valued by all groups; durability and comfort are universally expected; and while the 65M uniform is perceived as outdated, the 15M is regarded as the most modern and the safest in appearance.

The emphasis on durability and comfort reflects their central role in user satisfaction, aligning with research in thermophysiology and materials science. Across all groups, durability and comfort-related attributes (thermoregulation, ergonomics) showed the highest frequencies of endorsement, consistent with contemporary textile research, which identifies thermophysiological comfort as crucial in uniform design [29], and with the fact that structural material innovations primarily serve this purpose. The similar priorities of civilians and soldiers also indicate that, in this dimension, lay perceptual judgements converge with actual user needs.

Civilians and designers perceive digital-patterned, matte-surfaced uniforms as significantly more modern than older models, even when soldiers argue that the actual performance of the material is not necessarily radically superior. The 65M uniform is visually outdated, and a remark from a soldier discharged in 1975 suggests that its use around the time of the political transition elicited particularly negative feelings—an effect that faded once the garment became associated with everyday workwear. Such comments support Wallin's [43] observation that visual appearance is at least as important as material use in the evaluation of modern military uniforms. In contrast to the 65M, the 15M represents a successful development both visually and perceptually, meeting the goals of the Digital Soldier Programme by providing a comfortable and practical solution. The civilian perception data indirectly validate the success of the material and visual developments. Soldiers' feedback, however, nuances the picture, as they distinguish visual modernity from actual durability and offer critical insights into the 15M; yet, the opinion predicting no major changes in garment cut in future uniforms suggests that the 15M constitutes a sound construction.

Overall, respondents agree that design and function must form an integrated system in military uniforms, meaning that visual and material-technology developments must proceed in a coordinated manner. Achieving this requires further interdisciplinary research that incorporates

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material science, perception studies, ergonomics, visual design and psychological perspectives. Material selection determines not only technical parameters but also directly influences human perception, comfort and ultimately military effectiveness. Thus, beyond its protective role, the uniform serves as a communicative tool, signalling authority, professionalism, technological sophistication and safety – or, in some cases, failing to do so.

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