

Review

Sex-Differentiated Attire's Impact on Individual Action and Mate Selection

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Abstract: Various theories highlight the importance of using the actor/environment as the ideal unit for theoretical and experimental focus. Clothing, placed as it is as the intermediary between body and environment, is typically treated as a symbol rather than as either an integral part of either the body or the environment. When clothing is considered an extension of the body, the historical development of clothing reflects persistent differences in the physical capabilities of the human animal and operates as an instrument for solo action. In addition, it is argued that due to the ecological mechanisms connecting perception and action, differential clothing options for the sexes has led in no small part to differences in self-perception as well as the perception of others. However, when it comes to the very specific behavior of mate selection and procreation, clothing can be understood as a tether between two systemic units, offering a description of a system that allows for communication of potential social affordances and opportunities for joint action.

Keywords: ecological psychology; social affordances; mate selection; sexual behavior



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1. The Study of Clothing as More Than Symbolism

While many sexually dimorphic animals depend on naturally occurring and genetically predetermined cues for mating eligibility—think of the majestic peacock and his overstated feather fan of sexual readiness—humans do not solely depend on direct bodily differences when it comes to being sexually competitive. Humans are often more like bowerbirds, using bits and bobs from the environment to heighten their attractiveness. While humans can employ an almost endless array of techniques to increase allure, the current review seeks to weave a unified theory as to why clothing is one of the most intimate and evolutionarily influenced tools for human mating.

Traditionally, the aesthetic purpose of clothing has been the domain of social constructionists for whom clothing is a symbol, whose meaning is created within the mind of the observer [1]. Body coverings have become more complex over time, from simple animal skins to elaborate and highly labor-intensive ensembles. In the Renaissance, aspects of clothing symbolized everything from mourning to class-based etiquette [2]. When the complexity of clothing construction increased, it was cognitively transformed beyond its physical properties in favor of what it stands for conceptually. The study of fashion has traditionally focused on the outward expression of inner states or signifiers of group-based identities [3–5]. In these theories, clothing is treated more as a layer of the body, like paint over wood, rather than being integrated with the body it covers.

More often than not, it is the female of the species whose clothing choices are analyzed down to the last fiber. Single women dressing for a night out have been found to wear sheer fabrics, tighter garments [5], the color red [6], and even wider ranges of colors applied to the face [7]. Women's choices in ornamentation close to ovulation have been associated with sexual signaling to potential partners [8]. Wearing attractive clothing is often taken literally in these studies as a means of pulling a potential mate into her orbit for potential sexual congress, often by displaying more bare flesh than others [7]. When it comes to high-heeled shoes in particular, there has at least been some effort to explore the mechanism by which

heels are effective attractors for heterosexual males. Some authors have speculated that high heels for women of shorter stature serve to elongate their legs, at least visually, thus increasing their sexual attractiveness [5]. The height of a woman's shoe heel has been given much attention, showing a preference for taller heels when speaking with an attractive male [5]. The walking gait of females wearing high heels has been interpreted as being super-feminine, serving to exaggerate the rolling hips and the shortened step-length of the walker. In this study, the walker was described as both more feminine and more attractive by perceivers [9].

Although other psychological theories [10–13] could be used to place clothing into a particular location in the person/environment milieu, this approach would be, and has been, better served by schools of thought that allow for the symbolic use of clothing [14]. Instead, here, clothing will be contextualized using the Gibsonian version of ecological psychology [15] as combined with enactive theories of radical embodiment [16]. First, ecological psychology [15] emphasizes the study of the relationship between an organism and its environment and that the system they create should be considered the main unit of intellectual and experimental study. Next, there is little need for speculation of reasons and motivations for why an organism acts as it does in a given environment. Thus, it is possible to directly perceive the ways that an environment affords certain behavioral possibilities to an organism. Organisms in general will perceive how to achieve a particular action and act in a way that allows for a certain perception to be accomplished.

Enactive theories proceed from a point of perceiving found in action, and the repetition of sensorimotor actions yield purposeful cognitive structures [17,18]. That is, learned action contingencies are a conduit for uniting the actor/environment.

Recent efforts have been made to highlight staunchly held distinctions that exist in these seemingly overlapping theories [17]. In addition, work has been carried out that would bring these theories together through the concept of behavioral agency [16]. Through a practical application to clothing and fashion, the valuable contributions from each of these theories can be highlighted. The purpose of this paper is to propose a mechanism for the success of mate attraction through clothing. Specifically, ecological and enactive psychology is used to fully embed the human and their clothing within the larger environment. The consequences of this reframing manifest in both the individual, leading to differences in personal characteristics, and the environment, where individual actions within that environment become more actionable, including sexual behaviors.

2. Clothing as a Tool for Extending Solo Action and Agency

Before considering the influence that clothing has on potential mates, it is important to first classify the usefulness of clothing for the individual. Indeed, clothing is used in a way that communicates to others, a point we will explore deeply in the second half of the paper. However, when considered as an individual only, why do humans wear clothes? At some point in evolutionary history, our ancestors sought to go beyond the naturally occurring hair coverings that protected our bodies [18]. Perhaps they found themselves in new environments that were less temperate than areas they had previously wandered into as hunter-gatherer tribes. They could not directly manipulate their bodies into being more appropriate for the environment, so parts of the environment were manipulated to improve the chances of surviving in these new and harsher climes and terrains. Like a hermit crab that protects its soft abdomen from predators with a scavenged shell of another animal, humans needed to use resources from the environment as protection. Protection is the principal way clothing extends the actions of humans who are easily injured by environmental hazards, such as ultraviolet rays from the sun and sharp rocks on the ground. As humans migrated to distant parts of the planet, they developed tools that extended the amount of time they could stand new environmental hardships. In utilitarian ways, it seems likely that clothing served much the same purpose that a tool might, such as an axe or a hammer. Like these tools, clothing has played an integral role in improving human survival and proliferation in harsh environments. However, unlike an axe or a

hammer, clothing plays an important role in social survival in general and in our species' procreation as well.

So, are these pieces of attire closer to being part of the body or the environment? It has been argued that, through the act of putting it on the body, wearing clothing is an embodied process [19]. In addition, clothing has an especially intimate role in relation to the human body from the moment it is put on. By donning it, the clothing becomes part of the human body, that is, an extension of the physical body [20]. In this way, the act of putting on an article of clothing causes it to become less of the environment and more of the wearer. Through repeated action, the organism becomes attuned to the properties of clothing that serve to aid and hinder various physical actions.

Acknowledging the myriad of cultural interpretations of clothing, given the similarity of anatomical structure across the human species, the utilitarian purposes of clothing should be found to be universal. For example, shoes are one of the oldest examples of utilitarian clothing for upright walking bipedal animals [21]. In prehistoric times, grass was woven to create a foot covering that allowed people to walk in snow, using a design which, it has been argued [22], has yet to be improved upon. Thus, clothing changes the organism so as to make it a better fit with the environment. Consequently, a person has extended action capabilities in otherwise hostile environments with these clothing-tools, such as a volcanologist in a heat-retardant suit. Conversely, clothing that is inappropriate for a particular environment or task can reduce a person's effectivities [23], or the range of behavioral capabilities of the actor. Here, the clothes have to "fit" the actor to the environment, rather than just be well-tailored to the body. According to ecological/enactive psychology, perceiving and acting are intimately but lithely tied. Thus, people wearing certain kinds of clothing can also realize new information about the affordances of the self, such as a dancer who hears and feels heavy skirts as they swirl around her legs. Due to this connection between acting and perceiving, the wearer can then refine his or her perception of self and environmental possibilities given this new bodily boundary [24], i.e., embodying the tool. This could be done without the wearer actually performing a variety of tasks, paralleling the findings of Mark and colleagues [25,26]. They showed that people with blocks on their feet could retune their perception of whether chairs of differing heights afford sitting without actually sitting on the chairs.

2.1. Experimentation of Clothing as a Tool

If one considers clothing as a tool that has value across the human species, then experimenters should be able to study the qualities of clothing in the same way as other kinds of tools. Previous research on the user-tool interface [27,28] describes the functional relationship between the user and the tool as determined by how and where the user grasps the tool. In these studies, participants held and maneuvered the rods until they had the optimal grip on the rod, which differed depending on what task the rod would be used for. For example, when the rod would be used for hammering, the chosen rod had most of its mass near one end and was held in the hand at the other end. These studies illustrate the important fact that possibilities for action, or affordances [23], of any tool, including clothing, reside in the objective properties of a tool considered in relation to the organism and its action capabilities and effectivities. They also suggest novel avenues for testing the hypothesis of clothing as tools, such as people from different climates judging a pair of shoes as being good or bad for extreme weather conditions.

A concrete example comes from the LZR swimsuit created by Speedo especially for the 2008 Olympic team. The suit was specifically designed with a highly specified activity which enhanced the already highly skilled swimmers. The suit is not sewn shut but chemically bonded together so that the water will glide over the surface, making the swimmer slice through the water in a way that would not have been possible without it. Olympic level swimmers, such as Michael Phelps, report that swimming feels like a different activity with the suit, saying "It literally feels like you are a rocket coming off the wall" [29].

2.2. Sex-Differentiated Attire and the Actor

The analysis of clothing as it serves joint action among actors is yet to come in this paper, but the mere presence of another person is still important as they are apt to be looking for social affordances. In other words, there are private and public aspects to clothing [17]. The private experiences of the environment are for the solo actor. The public aspects are those that extend beyond the boundary of the actor's physical self and as such can be consumed by others. In these ways, the utilitarian uses of clothing for the solo actor have sometimes been sacrificed for the sake of communicating social affordances to other people for the actor embedded in a social environment. For the traditionally identified binary sexes, this has led to variability in the utilitarian uses of clothing. While of the same species and general anatomical structure, the attire for men and women has often been very different.

There are eras in history in which sex-differentiated clothing has been minimal. Hollander [30], in providing a thorough review of the history of costume, describes Greek, Roman, or Egyptian art showing everyone dressed in the loosely draped cotton and linen fabrics. These fabrics and styles were appropriate to those warm climates and afforded men and women similar kinds of activities. The situation changed after the Industrial Revolution when women withdrew to home and hearth while the men worked in the factories. The clothing at this point became more divided by sex, with women wearing long gowns that could hold back physical movement. When the activities of men and women are similar, whether by design or fate, their clothing reflects more about what is required for the task at hand rather than the sex of the person wearing the garment. For example, people today in pre-industrial countries have clothing more similar to that of the ancient Greeks and Romans [30]. That is, both sexes wear clothing that is more about the tool aspects and less about the emphasis of physical differences between the sexes. When everyone in a society needs to perform a wide variety of physical tasks in order for life to continue, the clothing should look less differentiated by sex, although class distinctions as described earlier will continue. This similarity shows that people today and their required activities are not so different from the ancients, but that communication has trumped utility in many countries that have the luxury of time and money to express themselves through fashion.

Historically, clothing that hinders movement, such as long skirts, have been labeled as a symbol of societal oppression of women [31]. Clothing that affords movement and activity had until recently been reserved for men [32]. The purposeful design of typical feminine clothing would at least in part have kept women from typically masculine activities such as hunting or manual labor. One striking example which Hollander points out was the hobble skirt, popular in the West in the early part of the twentieth century, which could have a circumference of only 36 inches around the ankles. The name for the skirt came from the fact that women would indeed need to hobble about. The physical limitation of certain styles was not lost on the contemporary public. Doctor Karl Francke pointed out that while men and women would suffer leg deformities at similar rates in youth, most men's legs would straighten on their own. Francke [33] stated the dress of women, "close fitting and furbelowed," would impede exercise and thus lead to the "great beauties of the day being knock-kneed." He went so far as to say that women are "quite as much in need of sartorial and political enfranchisement" connecting freedom of physical movement with cognitive autonomy. The consequent physical limitations placed on many women in the name of fashion were dependent on others to perform everyday activities, including getting dressed in the first place.

More recently, this issue has shifted to being physically hindered by too little clothing, because women need to be increasingly careful in their actions lest they expose their bodies to others. For an example, one can look at the typical "tank top," a garment of typically little material and with little in the way of structural support for the woman's chest. If one moves too quickly or in the wrong direction, the woman's chest would be exposed, going against the cultural standards for even modern cultures. If we accept that clothing is a tool that unites the actor and environment in a way that is an extension of the body,

it may be telling only half of the story to assume that the wearing of this kind of clothing does not have an impact on the self-perceptions of an individual. In the mid-nineteenth century, American women would hold up the right to wear trousers, part of the dress reform movement, as a basic symbol of freedom. Contemporaries saw it as a symbolic usurping of male position and power [31], but there is a more basic physical freedom that is entailed when one can act on more possibilities for action in the environment. Men would have long been more agentic because their clothing allowed them to ride horses astride and walk around in comfortable shoes. These opportunities have kept the scope of behavioral affordances open to them and their role has become one of more choice in how they deal with their body.

Behavioral limitations caused in part by sex-differentiated attire linger today, decades after the most restrictive clothing has gone by the wayside. Relying on the intimate connection between actor/environment, a new and perhaps radical possibility for the development of gender roles comes to light. It is proposed that, once a person's possible actions have been constrained by clothing for so long, perceptions and motivations for activity are also limited. This process mirrors the well-studied psychological concept of learned helplessness. When attempts at action are consistently thwarted, expending additional energy makes little sense. These habitual and generational limitations had an impact on the perceptions of women and thus they would become better at identifying only those affordances in the environment that require a narrowed range of physical movement, such as tending to the social needs of others. Eventually, the fact that their clothing impedes their activities would have been absorbed in the culture and reified by the roles that society allowed for women. Subsequently, generations of women would be taught that part of being a female in many cultures requires one to limit their physical activity.

Methods for testing such hypotheses are found in ecologically influenced research designs. By recognizing what information specifies affordance-relevant properties, it can be shown that perceiving and acting are lawfully determined. Indeed, the regularities of information that are used to judge an article of clothing should be universally found. While the tool qualities of a garment for simple solo action will not change with time (e.g., the qualities that make something raingear are not going to change until the physical qualities of rain change), in contrast, the additional social tool qualities of a garment should vary over human history as the societal desirability of various human attributes change. These supplementary qualities of a garment act to communicate qualities of the wearer to a perceiver.

Thus, people ought to be able to make realistic predictions about tool affordances based on physical characteristics of clothing with reference to the human body. Research has begun to examine the information that people use to choose among knitted shirts of differing fabrics [34]. The way that the fabric creates a microclimate of different temperature and humidity on the skin is directly connected to the way in which people perceive comfort. This idea can be expanded to a more general process of choosing the right piece of clothing for any given task or environment. Thus, while a person is wearing a particular jumper or sweater, he or she should show steady improvement in accuracy of prediction for the amount of time the person could withstand hot temperatures, before actually experiencing the heat. Note that the color and cut of the fabric should not be part of the decision. This is not to say that color and cut might not matter in another judgment task because the information needed for each decision is different for different tasks [28]. Cut may be of importance for judging "danceability" of a leotard, while color, feel, and weave may matter less. Color may be of importance if the judgment is "visibility" for a jogger at night, while feel, weave, and cut become less meaningful.

3. Fashion as Invitation for Joint Action

The socially embedded actor considers behavioral affordances of clothing that are not only physical but social in nature. At this point, it is useful to indicate that fashion will refer to attire that has been informed by nonutilitarian motivations. It is meant to

amplify, downplay, and sometimes defy portions of the body that already exist. Thus, fashion typically adds to the depth of reality, enriching it, rather than creating a new or imaginary representation of something that is part of a possibly false reality. Fashion provides rich information that can specify to others the action capabilities of that person. The exact placement of affordances in the actor/environment system has been deeply discussed by theorists (see [23]). However, once it is established that clothing can be an extension of the actor, who exists within a specific environment, it is possible to consider the definition of affordances as including other actors, especially when it comes to human sexual behavior [35,36].

In this way, clothing is more for the self in isolation, but fashion is often meant for the other. For the socially embedded animal, an invitation for joint action that needs to be communicated is mating availability. Thus, observers are often potential mating partners. Many non-human animals use a splashy show of color to indicate their interest and availability in mating. Since humans do not have the ability to instantly manipulate their physical appearance, as does the chameleon, or to announce their availability directly, as does the African mandrill baboon, fashion is often used as an indicator of willingness to engage. Since the biological means for human reproduction is the same within species, there should be some regularity in fashion for mating. For example, it has been shown that clothing choice in human females is predicted in part by how close they are to their ovulation phase of their monthly menstrual cycles. Women who were nearing ovulation were found to wear tighter, more revealing clothing [37] and were judged to be more attractive due to higher levels of ornamental clothing [8].

3.1. Fashion as Amplification of Mating Cues

Evolutionary theorists consistently find the same sex differences in preference for potential mating partners, whether short term or long term, with heterosexual women showing preferences for older men with more resources and heterosexual men seeking younger and physically attractive mates [38]. Research on physical mating signals from men seem to be limited to cues that are relatively difficult to modify with clothing, such as muscularity [39] or vocal pitch [40]. Slight preferences for certain sizes of male genitals have also been found [41], but often only when other physical cues are taken into consideration, such as height and shoulder-to-waist ratio [42]. The possibility that someone affords sexual activity, romantic partnership, and fertility is also communicated through fashion by providing additional information or amplifying existing information about the human form. Therefore, fashion is fully part of the actor but meant to be observed by others, especially those portions of the physique directly involved with sexual actions. The somewhat weak relationship between female sexual interest and penis size has not stopped men from using fashion to augment the visual prominence of their genitals. The most veridical historical example is the codpiece. This bit of sixteenth century fashion did not primarily serve utilitarian purposes, although some suspect it was used for storage for coins and the like [43]. For the most part, it accentuated the masculine form in graphic detail. Typically, the penis was encased in a stiff leather pouch, which protruded quite obviously from the body, a most obvious form of communication intimating the virility of the wearer, often padded and shaped in a state of constant arousal [44].

Women communicating fecundity have padded and restrained their bodies in order to exaggerate all kinds of curves. During and following the Black Plague [30], women padded their stomachs to look heavily pregnant, perhaps advertising their reproductive health in a time of widespread death and sickness. When the corset came into style, the focus became the waist-to-hip ratio, studied by evolutionary psychologists as a key component in mate selection [45,46], as it seems to specify fertility and health. Thus, it makes sense that women's fashion would magnify the hills and valleys of the female form. Consider the female silhouette of the Antebellum United States, when the 17-inch waist was the epitome of aspirational fashion. When paired with the then popular wide bell skirts, a woman's waist-to-hip ratio would be exaggerated to an extreme. In more recent years, technology

has advanced to the point that clothing is less necessary for modifying the body given the vast increase in cosmetic surgery [47,48]. In fact, according to 2019 research carried out by the International Society for Aesthetic Plastic Surgery, there was a 7.4% increase in the total number of surgical and nonsurgical cosmetic procedures, with most of these occurring in women aged 35–50 [49]. It seems that the reliance on clothing to communicate a person's ideal sexual affordance and mating suitability is no longer enough. In terms of directly communicating cues for social affordances, a woman's perceived use of cosmetic surgery indicated more to men that she was more sexually available in the short term [50]. However, contrary to what might be expected based on the current analysis, the location of such surgery (face vs. body) did not make a difference in the estimation of the target.

3.2. Cultural Uses of Attire to Mask Mating Cues

There also exists a strong tradition of using fashion to mask the physical mating cues of females through the enactment of modesty laws, both legal and cultural. Modesty norms for women are often contradictory. One must be physically tempting to potential mates but then manage those cues once one is mated to one male. For example, for Haredi women, who lead a life guided by ultra-orthodox Judaic culture, body coverage is prized but so is prolific levels of childbearing. The habitual production of large and indulgent meals is expected but so is a trim figure, often leading to disordered eating [51]. Amount and location of coverage that constitutes modesty will vary greatly over time and across place. When cultures conflict on concepts of modesty and freedom, women are again caught in the middle of laws that are meant to also manage the use and décor of their own bodies [52,53]. Objectification and self-objectification [54] are outcomes for women in a world that deprives them of direct power and agency. In these studies, the effects of a potential perceiver, specifically male [55], induce women to be increasingly critical of their bodies, leading to increased shame and negative mood. Bridging these studies to ecological theories of psychology, women in a dressing room trying on swimsuits essentially are demonstrating a shift from seeing themselves as actors in the environment to objects within it.

Evolutionary theories offer some explanatory value for modesty rules. Mate-guarding in the form of managing the modesty of a long-term partner may exist because of the competition for the best mating partners and paternal uncertainty. For example, the reliance on veiling of women's bodies may serve to make them less of a temptation to competing males. This was especially true when raising children in a harsh environment. Managing the coverage of a female mate's body is linked to avoiding caring for the offspring of others [56]. Ultimately, what is the fear that is driving these traditions? Is it the inflaming passions of hapless males who are slaves to their sexual urges? One does not require devotion to a particular religious tradition to observe this body management of women. Just refer to public and private dress codes in the US in the 20th and 21st centuries, from bikinis being banned on the beach to the abolition of teenaged girls being allowed to expose their shoulders or wear tight fitting but comfortable pants to school. Here, the person's opportunities for solo action are being sacrificed because of the potential for someone to mark them as an available object that affords sexual actions.

To this end, one way that fashion communicates possible actions of its wearer, not just in terms of mating but in general behavioral settings, is often found in information from the cut and movement of the garment. Fashion can communicate the effectivities of another person and thus the affordances that a person will provide the perceiver. For example, people viewed walking in high heels were judged as easier to attack than people who walked in flat shoes [57]. Thus, the clothing that targets wore directly specified the kinds of action capabilities related to attackability (e.g., ability or inability to run away) that the target had. It is important at this point to disambiguate clothing as an invitation for joint sexual affordances and sexual assault. This can be achieved by including the concept of agency. Segundo-Ortin [16] successfully argues for a unified theory of human agency that brings together more traditional forms of ecological psychology and

enactive theory. Here, agency is described as “a property of the relation between the organism and its environment, where this coupling is made possible by the existence of ecological perceptual information the organism can directly detect and exploit in guiding its action.” This is a very active and participatory definition for agency that includes all of the aspects of clothing that have been discussed: extending action within an environment for the solo organism and apprehending perceptual information to guide behavior. When applying this to human sexual behavior, the male actor/environment system and the female actor/environment system each retain their own agency. If one is using fashion as a means to invite others to joint social action, it remains just that: an invitation. There is nothing in this proposal that would indicate that the visual amplification of cues for social affordances would lead to loss of agency and thus excuse sexual assaults. Under this analysis of clothing and fashion, it still does not matter what a target of sexual assault was wearing.

4. Theoretical Conclusions and Future Directions for Experimental Research

In summary, human attire can be examined beyond the symbolic. Ecological and enactive theories of perception and action allow for clothing as a tool for solo action of the wearer. This leaves fashion as primarily meant for communication with observers. Given the anatomic similarity of humans, the utilitarian uses of clothing should be found to be similar across time and place. The only exception to this might be the clothing of females, whose limitation of movement has influenced social roles and self-perception of capabilities. Fashion is primarily nonutilitarian but can serve as one way to invite others to joint action. Fashion uses of attire will vary much more across time and place, but there should be more similarity when used as a cue for human mating activities.

Therefore, how do clothing and fashion fit into an ecological and enactive approach to human behavior? Specifically, the theories can offer a possible mechanism for inferential work that has been carried out in the past regarding clothing and fashion. Researchers can identify exactly what information people use to identify the tool uses of clothing and the affordances and qualities of others found in the information enhanced or created by fashion. Does some of the information about clothing specify both? What happens when the information is conflicting? To study this line of reasoning, one must first assume that “you are what you wear, and you act what you wear.” First, physical capabilities are communicated along with financial and social status through clothing. For example, the more veridical cues of affordances (e.g., listening to the footsteps of a person walking in higher heels) should increase the perceiver’s ability to accurately pick up on the direction (relative to the listener), the speed, and the size/weight of the unseen person. A typical research question might be, what does clothing do to amplify natural cues that are already there? Secondly, people perceive what another wears in order to detect information that will specify what that person affords them as well as that person’s possible action capabilities in the environment. Culturally influenced cues of social affordances allow for a reframing of existing research of preferences for mate selection. Combining ecological and enactive theories with evolutionary accounts of mate selection, a more localized and comprehensive account for how these cues function is possible.

It is also hoped that future research will use this set of principles to revisit sex, gender, sex roles, and gender expression [58] as radically embodied and enacted within the environment. For example, gender expression might benefit from the enactive-ecological account of agency [16], framing sex-differentiated behavior as learned patterns of action within a given environment. This could then add a layer of causality and explanation for the fashion code-switching women engage in to attract non-heterosexual partners [59], seem competent [60], and to manage a stigmatized identity [61]. In sum, this review should provide an effective guide to a scientifically sound and theoretically innovative program of research on human uses of clothing and fashion.

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