At human foot we are passionate about creating the world’s most comfortable woven sandal, but the secret comfort features we build into every pair will only work if your woven sandal fit correctly and work properly with your feet. For Designer to provide a wealth of information about looking after these miracles of biological engineering, wander, stroll or saunter in the utmost comfort. In this article, basic definitions and elements of woven footwear comfort and understanding comfort of textile materials, its relevance to braided footwear choice and some assessment methods have been discussed. The impact of fabric and braided footwear attributes on braided footwear comfort was explored. Psychological, physical and physiological perceptions of braided footwear comfort were reviewed, including subjective and objective modes of assessment. A thorough discussion of handle comfort was presented; including assessment methods for most researchers has been on sensorial and thermal comfort.

Keywords: Braided, Comfort Elements, Ancient Egyptian, Footwear.

1. INTRODUCTION

Braided footwear is an essential human need with several functions, braided Footwear in ancient Egypt was common, and although manufacturing techniques were fairly limited, the variation in forms is quite large. The present paper presents yet another category of fibre braided Sandal s: coiled sewn braided Sandal s (Fig. 1). As usual in studies of ancient Egyptian braided footwear, this paper focuses on the technological aspects and includes a description [1]. The choice of braided footwear is based on many factors such as personal desires, behavior consumers and the particular application; which are user dependent factors? However, people’s preferences may also be dynamic with fashion seasons, environment, age and type of activity in summer, to the wearer, comfort can be qualified as one approach to evaluate performance of braided footwear. In this concept, braided footwear engineers and designers ought to consider braided footwear comfort as a quality aspect contributing to total woven footwear performance and the user’s satisfaction [24]. People using similar braided footwear, in the same physical setting may experience different Comfort levels. Hence, some models footwear have been suggested to predict comfort response using defined variables. With increasing consumer information and concern, there is equally growing market competitiveness and research partly enhanced by wearers’ feedback on footwear comfort. On the manufacturers’ side, these studies are useful aides, in predicting appropriate footwear designs having in mind the material requirements and design elements in relation to the intended end use [26]. For instance, for summer footwear; the fabric type, and the nature and position of openings are important. During rest, the braided fabric plays the most important role, while, during activity, the design and location of openings is significant [27]. We reviewed recent works relevant to braided footwear comfort; mainly including basic definitions, comfort models and the general elements in braided footwear comfort.
1.1. DEFINITION AND SCOPE OF BRAIDED FOOTWEAR COMFORT

Comfort may be defined as a neutral state in which an individual experiences no pain or discomfort [14.7]. Comfort involves a balance of physiological, psychological and physical aspects between a person and the environment [14]. Braided footwear comfort is commonly associated with stimuli and sensations that shoes feel with change in human activity and the microclimate [18]. And the Related thermal compatibility to fabric surface contact dynamics. For footwear use, this idea was successfully explored further on fabrics, followed the trend, studied the structure of blended fabrics in relation to hand and while focused on sensations perceived by wearers, for different kinds of fiber/yarn denier, concluding that denier had an effect on final sensations. that although wearers consider design factors like fit, workmanship, style, comfort, color, ease of care, durability/serviceability, hand, absorbance, cool/warm feeling, fashion and design during braided footwear purchase, comfort was the most sought, followed by fit.[25, 29] that noted demographic influence in casual braided footwear selection in native China but stressed that comfort came first. Asserted the Home Economists [19] that wearers looked for a cool or warm, and/or smooth feeling in braided footwear, compared to attention on care and laundry guides. The comfort preference is more to the physiological and physical feeling than it is for psychological fulfillment.

1.2. MODELS OF COMFORT BRAIDED FOOTWEAR

Comfort is a wide and complex phenomenon with several attributes [5,8]. There are many models designed to explain braided footwear comfort. A few will be considered in this review. A model highlighted the relationship between braided footwear, the person and the environment. These three components were characterized by several variables, which included: rate of body temperature, perspiration, evaporation, smooth surface area and heart rate. These characterized the wearer. Braided footwear was characterized by thermal insulation, weight, thickness, air permeability/breathability, wind resistance and surface area. Environmental variables were; relative humidity, air movement, temperature and radiant heat. Variables related to braided footwear comfort were singled out to define braided footwear comfort as a function of the wearer, braided footwear and environmental attributes. The designed a subjective assessment model for braided footwear comfort by introducing psychophysiological attributes, including; fit, style and fashion, end-use, tactile and aesthetic properties and occasion (Fig. 1). We can modified concept was also introduced, stating that the wearer sieves through the physical and psychophysiological elements using inner personal modifiers to establish a comfort level. Such modifiers may include: personality like lifestyle, preferences.

1.3. ANCIENT EGYPTIAN BRAIDED FOOTWEAR

Description of Coiled sewn braided Sandals are a rather small group that includes specimens in the British Museum, the Petrie Museum of Egyptian Archaeology as example.[2].

1.4. SOLE BRAIDED SANDAL

The soles are made of a bundle of halfa grass, which is coiled. In the middle of the braided Sandal, the coiling might start by including the end of the bundle together with the first coil in the winding (Fig.1,[II]c), or not (Fig. [II]b). Sewing with small strips of dom palm leaf secures the coils; in doing so, the strips wrap the bundle (Fig. [II]d). In this, the manufacturing technique is the same as in sewn braided Sandals. In contrast to sewn braided Sandal s, in coiled or coiled sewn braided Sandal s, no edges are attached because there are no ends to finish: the coiling itself already results in a strong edge. However, one of the studied examples, Petrie Museum UC 28314iii (Fig. [II] c, double arrow), shows a very thin outer bundle. This edge is not functional in contrast to the edge in sewn braided Sandal s where it secures the ends of the horizontal bundles (Fig. [II] a).

Fig. 1: Three braided Sandals made with closely connected manufacturing techniques [3-4]. Scale bar in cm. [a] Dorsal surface of sewn braided Sandal, Ägyptisches Museum und Papyrussammlung Berlin.
Two different strap complexes [3-4] can be identified. One is comparable to the type of straps seen in sewn braided Sandals (Veldmeijer, in press [a]; in press [b]) but not much is left; only the attachment of the back strap to the edge of the sole is left in two examples. The other type is best represented by the pair of braided Sandals in the British Museum (EA 4432, Fig. 1 [a]). The front strap is a broad strip of papyrus, which is inserted between the bundles at the front, and secured with a half knot. The other end is folded, and originally looped around the back strap, which is now almost entirely lost. However, the ends of the papyrus back strap are still in situ, showing that these are inserted between the second and third bundle (seen from the outermost bundle), rather than being attached to the outermost coil (Fig. 1 [a]). Each one is secured at the ventral surface by means of an overhand knot (Fig. 1 [a], inset of ventral view).

2. EXPERIMENTAL WORK:

Design analyses of Braided Sandals Production and wear the production of coiled sewn braided Sandals consists of various stages. First, the material was collected and prepared, for which according is referred to work on ancient Egyptian basketry, gives much attention to this topic.

2.1. The Braided Footwear Comfort Divisions

There are three basic routes of classes have been broadly used to define braided footwear comfort, and include: psychological/ergonomic, sensorial/tactual/physical and physiological [15]. Each aspect is important relative to context and preference. Also, each comfort aspect is influenced by a variety of attributes within the braided footwear wearer-environment setting [20]. It is important to classify and describe these kinds of comfort perceptions and their stimuli

2.2. The Metatarso-Phalangiene Joints

Design analyses of A sketch of the foot is created by making a footprint of the planting top view (XY plan). This will provide a sketch of the foot, including the entire surface, the lateral and medial malleolus, as well as the ankle. The points required for the next steps are shown in Figure 2 [1] so that these features should be used when creating the contour for the barefoot print.

Figure 2: Anatomical Foot Measurement Points [1]

1 - extreme point of the foot, 2 - the center of the heel, 3 - the center of the external maleole, 4 - the center of the inner maleole, 5 - the bending point of the foot,
6 - the center of the metatarso-falangiene joint I, 7 - the center of the metatarso-phalangian joint V, 8 - the foremost point of the finger V, 9 - 10 - Extreme point of the leg.

Design analyses of The planes forming the leg network share this network at different distances, one of the planes being located below the lateral and medial males, with priority being to find the plant fingerprint. The contour is located on the XY plane so that there is a possibility of having a top view of the foot (XY plane) requiring this view to select the outline for the center of the metatarso-phalangian joint of fingers 1 and 5. In this way, points were selected from the XY plane below the plane of the joints 1 and 5. These two points will be referred to as 6_xy and 7_xy. To find the position of points 6 and 7, the lines are drawn vertically by 6_xy and 7_xy and the points of intersection with the contour of the foot result. These intersections are points 6 and 7.

2.3. Footwear in ancient Egypt

Modern man tends to consider whether not superior, at least completely different from the one who lived in antiquity. The truth is, however, that today’s people are similar to the old ones, and one of the things we have in common is ... footwear. Though this was not invented by the ancient Egyptians, and most representations show us barefoot, there was a type of footwear they wore on various occasions even before the third millennium, sandals. Their sole was made of woven papyrus or, rarely, leather [2], and was tied to the foot with a strap. Egyptian sandals resemble today, Fig. 3:

![Figure 3: In the first picture - ancient Egyptian sandal, and in the second - a modern sandal](image)

In most Egyptian representations, they - whether they are laborers, scribes, kings or gods - appear barefoot, but archaeological finds show that in reality sandals were worn at all levels of society, Fig. 4. Everyday people, travelers, soldiers, priests, pharaohs all wore them, especially during the Temple service, as well as in later life at the Judgment of Osiris (in the latter case, white sandals were compulsory as a sign of purity). They were so important that they were part of the pay of workers, along with other indispensable goods, such as wheat, barley, cloth. Besides the practical, sometimes aesthetic role, sandals also played a social role: a person with a lower social status had to be dissuaded in the presence of one with a superior social position. Moreover, from the first dynasty, there is also the prestigious function of the “Carrier of the Pharaoh’s Sandals”.

![Figure 4: Sandals with papirus braided sole](image)

Given the importance of sandals, it is obvious that there is a hieroglyph (a symbol) through which they were represented,

![hieroglyph](image)

and pronounced tjebut (singular), tjebut (plural).

It was even suggested that the hieroglyph for “life”, ankh, would actually be a sandal strap, probably due to the identical or similar pronunciation of the two words (“life” and “strap”).

![Figure 5: The pharaoh’s sandals](image)
focuses on the braided footwear comfort of individuals in relation to their roles, values and social being. It is concerned with internal self-sensitivity and the value of life, related to satisfying oneself within choices available [17]. The social-psychological spectrum analyzer involves personal aspects like body image, personality, cultural/religious/political values or beliefs, personal interests and awareness among others. And that also, there are braided footwear attributes related to details of the fabric and the braided footwear system. They include style, texture, aesthetics, fashion, suitability, design and color. Environmental attributes are also part of the psychological comfort zone, defined by elements like occasion, geographical location, climatic conditions, social-cultural settings and norms, and historical importance, to mention but a few. Wearers’ past braided footwear experience, choices for fit, the desire for comfortable braided footwear and feelings about their body do affect psychological perceptions. Again, social/cultural values and the visual and tactile information affect the perception of fit, hence influencing the perceived psychological comfort level [13]. Results on the relationship between braided footwear aesthetic attributes and general body characteristics showed that wearers who possess a lower body image, and/or whose body size is large, feel more comfortable with braided footwear that offers much cover. It was also established that consumer behavior relates closely to their attitudes and values. A connection to the physical and physiological perception was done, with an argument that psychological comfort involves the brain activity, formulating subjectively, an overall perception of sensory sensations from neurophysiologic sensory signals through evaluation of several perceived sensations, judging by previous experiences and the person’s inner wants [16]. Physical stimulus, the social and cultural environment, emotion, cognition and state of mind, among others are some factors that influence the psychological property of comfort. Physical stimulations also induce psychological and physiological responses between the wearer and braided footwear, while, psychological variations also induce physiological responses. These processes are cyclic; the induction of one induces another, accounting for total comfort perceived by the wearer [22].

3. RESULTS AND DISCUSSIONS:

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The statuettes in Tutankhamun’s tomb show us wearing gold sandals. The pharaoh’s sandals [32] are made of wood and covered with a veneer of pearls, green leather and gold foil on a reed base, Fig. 5. The outside sole are covered with a white reed. The ankle straps are made of shell ornamented with a pattern drawn in gold foil. The inner soles are black and Asian captive figures, linked to lotus and papyrus stems. Above and below are groups of four arcs which, together with the captives, represent the nine traditional enemies of Egypt, which the king felt painfully when wearing the sandals. The device had a long history dating back over a thousand years. In wearing sandals, it’s very important that papyrus or lotus bracelets and straps do not kick the leg while walking. Thus, in their manufacture, the joints given in points 5, 6 and 7 (5 - the bending point of the foot, 6 - the center of the metatarso-falangian joint I, 7 - the center of the metatarsal-falanga V joint) which gives your feet foot comfort. It is also important to look at how it affects the skin and nerve sensors of the skin, the materials from which the beads and straps are made, made of leather [2], papyrus and lotus, decorated with gold foil(for the pharaoh’s sandals).

Some models of the modern sandal, are identical with the ancient sandal. There are a lot of influence in shoe design, which is coming now in the tendencies for new models, Fig. 6.

![Figure 6: Antique sandals, very nice decorated with natural colors](image)

![Figure 7: How are dressing the ancient Egyptians.](image)
toward discomfort by the wearer when braided footwear wholly or partially touches the wearer’s skin [21]. During activity, physical stimuli from skin braided footwear interaction stimulate various sensory receptors as thermoreceptors, photoreceptors and mechanoreceptors, giving rise to a psychophysical perception. The term “fabric hand” usually applies when assessing the sensational property of textiles [23]. Fabric hand is critical to players in the textile value addition chain; from manufacturers to merchandisers, in the selection and development of materials, in the selection and development of stiffness. Prickliness and itchiness reveal discomfort in form of pain. Thermal sensations can also be felt in the same way by touch, including warmth, coolness, breathability, hotness and chilliness [6]. Examination of textile materials, intended for use in apparel [28, 11]. By touching braided footwear fabrics, we can feel tactile sensations like smoothness, roughness, prickliness, stickiness, scratchiness, softness. Moisture sensations are another hand perception, and they include among others; clamminess, dampness, wetness, stickiness, nonabsorbent and clinging. Pressure sensations which relate to body fit are another category, and may include snugness, looseness, lightweight, heaviness, softness and stiffness [2, 6, 12]. The skin is said to be highly sensitive to mechanical stimuli, with a braided footwear pressure to cause a sensation of discomfort, and other sensorial properties include: acoustic nature related to sound and hearing, visual or aesthetic braided footwear perceptions and the odor characteristic. Some fibers have natural smell or absorb and retain odors easily. This is typical of synthetics like polyester, and to a small extent, silk a natural fiber and Wool a natural fiber has a natural antibacterial property by richness in fatty acids [15].

3.2. Influence of fibers and yarns on sensorial comfort

The braided footwear of overall effect on sensorial comfort of is a combination of several characteristics of each materials involved fibers, yarns, fabric, finish and the wearer. Fabrics made from 100% tough fibers like Jute and linen possess high bending rigidity and tensile resilience, while offering low shear rigidity and shear hysteresis magnitudes. Such braided fabrics are stiffer and also have higher surface friction. On the other hand, braided fabrics of 100% cotton, blends of cotton/Jute/linen, and viscose/linen/cotton, or linen/viscose have relatively lower bending rigidity, in addition to a softer and smoother braided surface, and better resilience [5]. The fiber structure and braided morphology definitely affect the yarns’ aesthetic footwear properties, and so for the fabrics, including friction properties of braided footwear. According the round shaped fibers are said to exhibit higher luster compared to irregular shaped fibers and multidimensional fibers throw braided footwear. Also, with increase in fiber diameter, density and tenacity, prickliness of braided fabrics does increase. Finer fibers yield smooth and flexible yarns and fabrics of better draping quality [4, 9, 10]. Higher fiber-to-fiber friction limits the ability of fibers to slide against or slide past each other during yarn and fabric deformation hence affecting the yarn flexibility. Fibers of higher crystallinity and alignment such as linen are generally tough and possess higher bending rigidities [28, 10].
as braided texturing, give yarn necessary bulk and stretch, and in braided turn the resulting fabric acquires a warm and soft hand compared to flat filament yarns into braided footwear.

5. REFERENCES


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