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San People Culture, Arts And Designs

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Abstract
San people are a race that has existed in harsh conditions for tens of thousands of years. Despite the atmospheric and geographical conditions, these people have survived with their knowledge, arts, designs and productions that have been passed down from generation to generation.
This study is basically shaped by examining, analysing and analysing the art and design commodities of the San people in terms of function. At the point of understanding this basic situation, the contexts of each design object with culture and life have been investigated. Field research (observation), visual interpretation and analysis as well as literature review were frequently used in making sense of culture-life and commodity relations and producing information. In the study, examples of innovative design approaches to conventional problems were discussed in detail, while some designs were not included in the study. Form-design-use analyses for the related instruments were examined by comparing them with modern commodities, and discussed in terms of material and production. The initial question of the study is to explore how culture and reality combine with function and reach design with the knowledge of experience through San'lar.
As a result, a design strategy is explained through conventional, traditional and innovative realities, detailed analyses of the designs of San people are made, the behavioural patterns of these analyses are revealed and a research technique is proposed to designers and design students working on innovation.

Keywords
San People; San Culture; Design; Product Design; Design Strategy; Cultural Art.

1. Introduction

There are questions such as where the human species came from, how it came, where it started, and how it progressed as a sample set that today's anthropological science and research on DNA have in common. The widespread findings that constitute scientific answers to these questions, as well as new and surprising data on human history, culture and life, show that human beings, a dominant species spread almost all over the world, originated from the African continent (Başoğlu, 2010: 342). It is possible to find the basic human DNA and its remnants, which spread from the African continent to the earth at different times and in different ways, in every part of the world. This basic DNA, which has been dispersed from Africa to present-day Australia, the Middle East, India, the remotest corners of Asia and from there to the American continent through migration waves, trade axes, life struggles, and different time

periods in order to follow the right prey and the right weather, has been subjected to changes in many aspects from geography to function, from climate to survival struggles and has created diversity in its own essence.
Linnaeus' 1758 definition of Homo Sapience (Linnaeus, 1758: 20-22). is considered as an umbrella term covering all of these DNA sequences. Many scientists and thinkers such as Carl Linnaeus Charles, Darwin, Thomas Whiffen, Carleton Stevens Coon etc., anthropologists, zoologists, phrenologists, biologists, sociologists, philosophers, etc. have handled this spread and development from different perspectives and defined different procedures and processes based on different findings (Darwin, 1859; Whiffen, 1915; Coon, 1962). Although much of the information available in the light of today's modern science disproves the theories and studies of these names, it can be stated that the basic intentions and approaches have persisted for centuries. In order to answer this intention, modern technology and science read new data especially through DNA and protein structures. Population geneticist Wells expresses this situation as DNA is a long historical documentation, a document related to the origin of life (Wells, 2006; Dawis, 2018: 15).

As a result of Wells' work with human DNA, the deepest and most unchanged remains of the most basic DNA take us back to Africa, to the southernmost tip of the African Sahara. In today's Africa, the natural topography between Cape Town and the Republic of the Congo, spreading eastwards and neighbouring the north-eastern parts of the Atlantic Ocean, especially the western front can be described as the place where perhaps the most pristine and pure form of this basic DNA can be found. The "San people", who have been living in the region for thousands of years and still preserve their cultural heritage despite the conditions of the modern world, offer the rarest example of human DNA spread throughout the rest of the world. San people have attracted the attention of the scientific community for the last 60 years (Barnard, 2007: 4).

The San people, who have existed for approximately fifty thousand years and who have not established a major relationship with any of the migration waves of various scales that still continue, are expressed as a race that has never left the African continent and has never left the relevant geography. San people, who are not subject to DNA mutations and adaptations such as people who are displaced by migration waves or changes as a result of geography and atmospheric relations, live in the Kalahari deserts and the surrounding 80-100 km² area, with their own culture, dynamics, rituals and abilities, and exist in a reality quite independent from the outside world.

The San people, who are thought to have an average population of 50 thousand today, live a culture and daily life shaped in the context of the realities and requirements of the relevant geography. Due to the migrations from external regions to internal regions, as well as being located on migration routes, the San people have become acquainted with many different practices. As a result of these encounters, they developed both basic gathering and semi-nomadic hunting practices. The knowledge and experience gained through hunting and gathering practices can be considered as one of the major factors in the survival of the San in one of the most difficult geographies of the world for generations.
Until recent times, it is known that the San races lived completely natural, integrated with nature and connected to their own culture, practices and rituals. This way of life, which is the key to survival in this harsh geography and atmosphere, can be considered not only as a representation of respect for ancestors and intergenerational transmission, but also as a dynamic that responds to the existing function. All of the dynamics that make up the way of life consist of practices produced and transmitted in order to access the needed reality. Extreme relationships established with the seasons, the realities of living with predators, the struggle with water, topographical obstacles, etc. It can be stated that many elements such as customs and traditions have a quality that serves the function. It can be stated that the biggest problem in this way of life, where every kind of life practice involves a major problem, is the relationship established with water. The Kalahari deserts, which span almost all of the relevant region, are a region that receives rainfall for only one-and-a-half months in a year on average. In the remaining

period, it is not possible to talk about a direct relationship with water. In these dry days, the San have learnt to use other blessings of nature to meet the needs of their bodies and to get maximum efficiency from them. They fulfil their water needs with opportunities such as tree trunks and roots, underground resources of the soil. In addition, as a culturally coded tool, the egg relationship, which contains belonging and can be claimed as a right, which individuals own with their own seals and which plays the most important role in the transportation of water, is also very valuable. Ostrich eggs, which are rich in both protein and water and are large in volume, are not only a basic resource but also turn into water carriers after consumption. More than just food, ostrich eggs are subject to a recycling circle in which they are carefully consumed, carefully protected, delicately emptied and then used as a liquid container. This labour for the transport and storage of water represents the most important meta-human commodity.

During a 10-11 month period without any rainfall, it is possible to extract the oil and juices from plant roots (which is not naturally sustainable as it completely destroys the plant and is therefore not favoured as much as possible) or to kill live animals to consume their internal fluids. High drought makes hunting relatively risky and unnecessary. At this point, continuous movement becomes a necessity. The most important resource available in this semi-nomadic form is the food called wild melon. As a person with an average physical structure, the San have to consume 4-5 kg of wild melon per day. The nutritiousness of wild melons is supported by underground tubers. On average, each San has to find, dig and extract 20-30 pieces of tubers every day. Even in short periods of rainfall, San are always in a life with the dangers of death related to water and temperatures. It can be stated that the most important quality in the elimination of these dangers is the daily life instruments shaped by the rituals, practices and practices of their ancestors.This situation can be observed at every point of life, from finding food to obtaining it, from individual and social defence to sexual ceremonies, from relations with wild animals to shelter, beyond the relations established with water and temperature. Despite the pragmatic gathering relations at the point of survival, hunting and game meat are considered as a semiotic element in San people. So much so that, as encountered at many points in human history, the rite of passage to manhood in San people is also associated with hunting. The relationship established with game meat includes a dynamic with relatively sacred contexts above its nutritional value. On the other hand, hunting organisation is, in the simplest terms, a demanding activity that enables a group of San adults to travel an average of 50 km a day.

Although these distances, which mean crossing the deserts on foot, are a normal and everyday affair for the San, of course they have to travel light. The few commodities that accompany this journey are the knowledge and experience accumulated from traditions, ancestral experiences and designs passed down from generation to generation.Although the lives of the San's contain many more special nuclei that can be culturally transmitted, the points where cultural elements meet with design are more important due to the essence of this study. It is possible to encounter a cultural commodity from the past in every life stage of the San. These commodities can be considered as designs shaped by the knowledge of experience, passed down through generations, and specialised for singular functions.

This study is basically shaped by examining, analysing and investigating the commodities used by San people in daily life and special moments in terms of function. At the point of understanding this basic situation, the contexts of each design object with culture and life, ritual and function have been investigated. Field research (observation), visual interpretation and analysis as well as literature review were frequently used in making sense of culture-life and commodity relations and generating knowledge.Form-design-use analyses for the related instruments were examined by comparing them with modern commodities. The materials, production and production methods of the San's manufactured commodities were researched through the literature and then analysed at the relevant material-production scale.

Discovering how concepts such as culture, tradition and ritual are combined with function and how they reach design with the knowledge of experience through the San's constitutes the initial question of the study.

2. The Concept of Culture

As an inclusive and general concept, culture can be characterised as all the elements that constitute the basic characteristics and life of a society, community, class or group(Herder, 2020: 284). However, the concept of culture is not characterised as a fixed and unchanging concept. On the contrary, it can be considered as a living organism that is constantly changing, developing and articulating.

The concept of culture is a concept that is very difficult to define with its complex relationships (Williams, 1977: 76-77). As a sociological phenomenon, culture has a hierarchical and selective meaning that shapes complex social relations from prehistoric communities to contemporary societies. In this form, the idea of culture reached its final form 120 years ago (Bauman, 2021: 38). In a general framework, culture is a complex and chaotic whole that encompasses, develops and transmits knowledge, art, beliefs, morals, everyday dynamics, habits, etc. that are assimilated by any member of society. This whole is an objective accumulation and pattern of the outputs of similar communities. Casusadis characterises this euphemism as a fuzzy concept with unclear boundaries and different meanings at different moments(Causadias, 2020: 310). This fuzzy structure refers to all the formations and ways of being that human beings create and exist in (Uygur, 2006: 17). According to Bauman, culture is "the source of created and borrowed things". The transitive and transferable aspect of culture mentioned here also makes it possible to transmit it through fixed symbols. This system of symbols emphasises the function of culture in creating common meaning and memory and makes it possible to share a systematic communication and unity. Culture serves as a source for the individual to make sense of himself/herself and his/her environment, and provides a way to harmonise and regulate his/her behaviour with the environment (Bauman, 2021: 21).

A semiotic reading is almost compulsory in the interpretation of culture, which is a system of symbols. Whether in modern or ancient cultures, this set of signs and symbolic language that shape social behaviour is an emphasis on the reality of communities. Despite the globalised culture of the modern world, which has become a common language, the indigenous cultures of Africa, Asia or South America offer very valuable examples today. According to Bauman, the concept of culture has often been conceptualised outside the realm of commodification (Bauman, 2021: 38). and it can be said that indigenous cultures, which partially preserve their cultural autonomy, have a great influence on this. The people of the San race, one of the last examples of hunter-gatherer culture and lifestyle, offer social scientists unique examples in this regard.

Climate and environmental conditions, which are among the most important elements shaping the life of local communities, can be expressed as the basic element and shaper of culture. This direct and unmediated relationship with nature constitutes a large part of clothing, nutrition, shelter and social rituals. This ecological and climatic adaptation shapes the basic indicators of culture. One of the most fundamental shapers of hunter-gatherer cultures is the concept of the cultural food list. Every culture has a dietary regime; the basis of this regime is the knowledge passed down from ancestors that determines which plants or living things can be consumed. Ancestral culture has a dominant influence on almost everything from diet, hunting, food processing and preservation to marriage and gender rituals. Even the relationship with water, which is the most basic survival problem of the San people living in the Kalahari desert, is still a part of the ancestral culture. Another important cultural element is organisation and economic dynamics. In local or hunter-gatherer cultures, organisation usually consists of small groups/teams. As mentioned above, the most important factor in this is the sufficiency/scarcity of water and food resources.
The most effective way to ensure economic sustainability is the continuity and re-circulation of food resources. It is known that seasonal cycles and social exchange are

important determinants here. The culture of exchange is largely shaped within the framework of barter relations through food, goods and marriage. The best example of these contacts is the silent trade or kula cycle (Nar, 2019: 218). Silent trade is common between the Mbuti Pygmies and Bantus, two hunter-gatherer communities of West Africa. The Pygmies leave the objects they obtained from hunting and gathering but do not use in bulk near the border of the Bantu villages, in the same way the Bantus leave the products or objects they want to exchange near the border of the Pygmy villages. After a while, both peoples come to check the products left there and if they do not like them, they leave the place without touching the products. Again, the Argonauts, a fishing community living in the islands of Western Oceania, sail to the sea and exchange the products and objects they have through trade. This type of exchange is called kula. Fishermen in canoes exchange necklaces when travelling clockwise and bracelets when travelling in the opposite direction (Aydın & Erdal, 2007: 122). The act of kula is a cultural representation of trust and sustainable exchange.

3. Ritual

As a thematic feature of our species since the past, we act according to a set of rules in all social relations and stages, from art to daily life, from craft to production. Ritual can be considered as the formative aspect of social structure and relations in general. However, ritual carries the function of giving an authentic, sacred or mythical, sometimes pragmatic or functional meaning to the action performed with elements such as timing, spatial arrangement, behavioural patterns and paradoxically feeds on these elements. In this sense, ritual refers to a symbolic reference system familiar to all individuals within the group, defining a meta-language that enables individuals to understand their experiences within the framework of certain concepts and norms. Bell states that the concept of ritual is the basic structure for the existence of culture (Bell, 2009: 14). Dennis W. Rook defines ritual as a repetitive symbolic language that exists and takes place in a certain order (Rook, 1985: 251-264). In this respect, this social contract that establishes and constructs cultural ties is a field of discourse and representation where hierarchical social networks and power relations are also established. In hunter-gatherer communities, commodities, sharing, artistic elements, idols, music, designs, stories and narratives, food and drinks constitute the basic elements of ritual. Events such as marriage, death, transition to adulthood, preparation for war, hunting are the main performance areas of ritual.

Seasonal transitions, harvest festivals, commercial activities and all similar ceremonies that bless the unity of the bond with nature are full of rich and symbolic narratives of rituals and traditions. All these narratives play a key role in the individual's understanding and internalisation of the community and its rules. In hunter-gatherer cultures, they are often apriori the object of intergenerational transmission within the oral tradition, of the construction of collective memory, and are the point of departure and, to some extent, the point of arrival of transmission; therefore, they are both the subject and the object of this construction process at the same time.

In hunter-gatherer societies, tools, jewellery and even bodies can be expressed as the carriers and performance spaces of this symbolic communication and activity. Designed commodities and actions are at the centre of social rituals; they guide social functions such as healing the sick, finding water sources, and praying for rain.
In general, regardless of the purpose of the ritual, it fulfils a social function ranging from a sense of commonality to solidarity (Murtezaoğlu, 2012: 346). In this respect, ritual plays a key role in the construction of a collective memory from hunter-gatherer communities to modern societies and in strengthening the inter-individual and intergenerational context as its transmitter, while in hunter-gatherer cultures, ritual reveals the most basic element and continuity of social life.

4. Examples and Discuss

Example 1 – Musical Instruments

Although it is seen in the field research that the most basic music production of the San people is centred on

Figure 1. The use of bow and arrow as a musical instrument (Chris Oberholster, *San Tribe: Once We Were Hunters*, 00:05:57).

the human voice, it is possible to mention the existence of two different instruments. Although music and polyphony is a dominant cultural element among the San people and a carrier of a teaching that is transmitted between generations, there is no advanced sound production and standardised sound producers in the relevant field. Instead, there is the use of elements of the natural environment, the use of the mouth, the use of the body and the use of non-standardised commodities. Another important element is that manufactured commodities whose main function is not music-sound production are used as sound producers.

The bow and arrow, the most basic element of defence, attack and hunting of the San people, was also used as a musical sound generator in addition to its basic functions. The single-toned rhythmic sound produced by the vibration of the taut string of the bow was used as a kind of instrument that allowed the mouth to control the tonality and the arrow to reproduce the sound (Fig. 1). At this point, despite the not very surprising presence of the related action in terms of technique and form, the dual use scenario in the case of a commodity that is both a hunting element and a musical instrument with social value is striking.

Although this form of action, which is frequently encountered in daily life outside the hunting process, can be considered as a limited instrument with its narrow sound range, limited intonations and non-standardised sounds (notes), it is possible to talk about a sound producer (rhythm instrument) that reveals a unique production with the difference of each individual's own bow and arrow and the difference

of each mouth control. This unique production can be considered as the originator of quality at the most basic level. The bow made by each San person has a structure with different tension, length, angle and strength, and different string properties than another bow. Although the basic geometry, the materials used and the production methods (both holistic and detailed production) are common (a method transmitted through intergenerational transmission and collective knowledge), it can be clearly stated that each bow, which is the product of this industrial and non-standard production relationship, has a different sound from the other.

By inserting one end of the bow into the mouth and pressing it against the inside of the cheek, with the lips vaguely touching the bow string, several different main tones and coma sounds between the main tones are obtained on the bow string, while a continuous sound is produced by rhythmic strokes on the wooden part of the bow with the arrow. The rhythmic-continuous sound in this narrow tonal range exists in a different tone (tonal range) in each bow and in a different colour in each mouth and different sounds are produced. In other words, there is a situation where each instrument, which are identical to each other but none of them are exactly the same, become polyphonic with a common technique.

However, there is a commodity that can be considered as a sound object in the San culture, which can be categorised as a percussion instrument (a kind of xylophone), with common basic geometry and production methods, different forms and sounds (Fig. 2). This percussion-type instrument, whose derivatives are called “Sanza” throughout Africa, consists of 3 main parts: the base, which is a square with sides of about 16-18 cm, the middle part, which is about 2-3 cm high and 12-14 cm wide, and the upper part, which has sound pieces of different sizes and thicknesses.

The first part (the base part) can be expressed as a base that creates a flat surface and forms a basic geometry that serves the holding action. The second part (the middle part) is a raised geometry that acts as a sound box, hollowed out and with the outer edges left, which acts as a case for sound formation, increasing the sound output power and stabilising the tone. The first and second sections are integrated and are made of a monolithic wood. The second section is the sound box, but it also serves as the structural structure in which the parts of the third section, which form the vibrations that produce the sound, are attached, fixed and compressed. Although the forms of the first and second sections are different in each product, their basic geometry and forms are close to each other, almost expressing a common language.

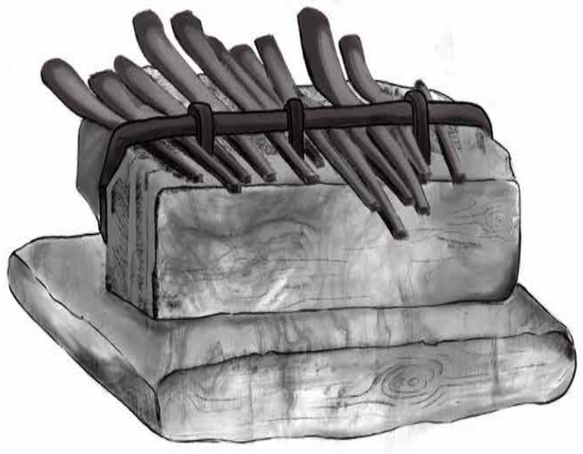

Figure 2. Conventional San Percussion (visualised by the author)

On the other hand, the third part, which creates the actual sound vibrations by tapping, pulling and pressing with the thumbs, is completely different in each product. In this way, each product is different depending on the craftsmanship of the maker, the quality of the production, the cross-section and dimensions of the material, the pressure of the forging, and even the production of the stone used in the forging.

This section contains 10-12 sound bars, which are simply cut and smoothed metal rods shaped by cold forging with the help of a stone according to the desired sound. As a pre-production that makes the forging process possible and qualified, there is the production of stones that provide the forging action. Due to the size of the sound pieces and their proportional ascending and descending tones, this production can be expressed as a representation of a qualified production even though it is made with a conventional technique. For this reason, the stones used during the forging of the pieces are carefully shaped beforehand. Another factor affecting this situation is the daily and cultural life of the San race people, who live integrated with nature, against the concepts of material use and waste. In other words, as a result of a culture shaped with the understanding of less material consumption, less material waste, and a practice accustomed to working with limited materials due to the fact that everything is obtained from nature, it is necessary to produce the stones that make production possible correctly in order to produce the sound parts correctly. This situation, which we can refer to as the design of the workbench (Sennett, 2013: 291-297; Ardatürk, 2020: 228-242) for detailed information see, can be considered as a basic indicator of a craft action in which the knowledge of qualified production and experience is transferred. While one end of the rods is left in their basic cross-section, the other end is forged to shape and thickness to produce different sound vibrations. The forging process is not just a moulding of the ends, but an organic shaping of the material as a whole. As in general metal forging processes, all steps leading to the final shape must be foreseen from the beginning. In cold forging, especially the material response of the metal is indirectly affected by time and action. In other words, when forging a metal part with sufficient cross-sectional thickness, not only the point of impact but also other places other than the impact point are shaped by molecular transmission. The pressure transmitted in the material finds a swelling area at a suitable point in the direction it travels, and the effect occurs in a place other than the impact area. It is possible to control this situation with many years of trials and the correct transfer, interpretation and development of these trials.

As a result of the forging process, the ends of the sound bars exist in many different geometrical patterns such as surfaces, blunt ends, round ends, rotating surfaces, flat surfaces, curved surfaces, etc. When these different geometries, which seem uncontrolled from a distance, are examined in depth, it is the knowledge of experience that produces different tones and enables them to exist with an arithmetic increase-decrease. Although it can be said that each piece is thicker than the previous one and thinner than the previous one in terms of sound scale, it can be stated that the sound intervals between the pieces are not equal.

In classical music (and most of its instruments), instead of standardised and fixed sound intervals such as whole tones and half tones (1 whole tone interval between C and re, re and mi, etc., 1 half tone interval between fa and fa sharp, si and si flat, etc.), there is the production of convergent sounds that define approximately an octave. In other words, even if the initial tones of two products made of the same material are the same, each subsequent sound creates a different tone in the same range. Thus, each product and the sounds of each product produce a unique formation.

Example 2 – Hunting Instruments

Although hunting is a relatively less effective source of nutrition compared to gathering due to the large amount of energy and time spent, the length of distances to be travelled and the dangers of other natural conditions, it is a permanent representation and action because it provides animal food (animal protein and fat), provides an alternative food to gathering, provides different

elements such as hair, skin, fur, bone, horn, etc., and is the basic ritual of the San race culture. This action, which is the provider of the transition of San race boys from childhood to manhood, which is effective in the production of commodities and the transfer of culture over time, is still not as effective as gathering in terms of survival. Although it may be thought that the productions related to this action, which is a fundamental part of culture, the provider and carrier of tradition, are surrounded by concepts such as advanced, detailed, innovative, etc., researches reveal the opposite at many points.

Bow and Arrow

It can be stated that the most basic and most widely used hunting instruments in San culture are the bow and arrow. It can be stated that the most fundamental difference between these two products is the concepts of individuality and belonging and collective public.

It can be stated that each of the bows produced belongs directly to the producer, is special to the producer and is shaped by the skill of the producer: Both the individuality of bow production as a cultural responsibility, the connection and belonging of what is produced with the producer, and the non-functional ornamentation and decoration of the producer, each bow becomes a commodity different from the other. As in the case of a musical instrument, although the basic geometries and procedures are common, it can be said that the final products are individual in nature.

On the other hand, it can be stated that bow production is a collective action that involves a kind of collective structure, does not involve individual belonging, and that production is a collective action with similarities to fordism and mcdonalsism rather than individual. In contrast to the individual endeavour that exists in bow production and the fact that the entire process is shaped by a single producer, arrow production is closer to the existence of stations focussed on a single task, as in Adam Smith's pin work. At the point of defining the bows used by the San race, it can be stated that the most accurate concept is "conventional production", in addition to this, there are parts subject to "traditional production" with the knowledge transferred between generations. It can be stated that the joint details shaped to include the connection of the basic structure (wooden part of the spring) with the tension rope at the ends are conventional. Although these connection details may seem creative at first glance when interpreted with the knowledge of today's modern world, the fact that these details are conventional (ordinary) is revealed when more than one product is examined. On the other hand, it can be easily observed that the ornamentation, decoration and sealing found on the same bows exist in a traditional form with ancestral tradition and family knowledge.

There are differences in the materials and designs of bows (and arrows) in different San tribes spread in different parts of the Kalahari desert. It can be stated that these differences are basically shaped by the atmosphere (more profoundly by the presence of dominant winds). Understanding the factors of wind direction, load, and prevailing wind power is the first step in understanding the relevant geography (Gooley, 2019: 20). Wind load and direction-direction of dominant winds affect everything in natural life, as well as bow and arrow designs and materials, and play a dominant role in their formation. In addition to this, temperature and humidity differences between regions, topographical features and their relationships affect the tradition and culture, and therefore the design, material and production.

Although different San tribes in different regions of the Kalahari desert may have different design and material characteristics, it is possible to speak of a general and common typology, language, procedure and method when it comes to bows and arrows. In terms of the expression of this common language, the bows of the San race people, in contrast to the bows of both the modern world and ancient civilisations, have unique qualities. The first recognisable characteristic is the angle and length (difference), which constitute the basic geometry (Fig. 3).

Figure 3. San Race bow and Arrow (from the author's archive)

Independent of (or even contrary to) the measurements commonly used in human history, San culture bows are generally 70-75 cm long (with regional variants in the 90-95 range and bows 110-120 cm long in a single region) (Fig. 3). These 70-75 cm springs show high strength characteristics due to their length, but their stretching ability is low. At this point, the pulling range of these bows (the distance between the bow and the string when stretched) is around 20-25 cm (in a modern bow, this distance is around 100-120 cm). This measure is contrary to all known draw ranges. The bow and arrow (despite some disadvantages) have been used as a dominant tool in every geography in every period of history. The main reason for this situation is that the existing distance between prey-predator, individual-threat can be made distant with a bow and arrow. The increase in this distance increases the probability of the user's survival and the probability that his prey will not notice him. Access to the relevant target is provided from a safe distance. There are numerous bow and arrow designs that provide this situation.

In fact, increasing this distance creates a quality that changes the course of wars and enables people to catch large prey without being noticed. In accordance with the basic principles of physics, the shooting distance is formed by the discharge of the potential energy accumulated with a tensile strength created against the strength of the bow and its transformation into kinetic energy through the arrow. In other words, the distance travelled by the arrow increases as the bow string is stretched (as the draw range increases). On the other hand, with a draw range of 20-25 cm, the effective shooting distance of bows of the San breed is 20-25 metres (it can be said that the ineffective shooting distance can be around 40 metres). Many prey mammals can easily smell and hear a human at a distance of 20-25 metres. For a gazelle or a deer, this distance is 4-5 times more distant. In short, it can be easily said that hunting a deer with a shot of 20-25 metres is close to impossible for today's people. In addition, the accumulated potential energy of an arrow with a 20-25 metre shot does not have the power to completely pierce the hard skin of a

deer, damage the internal organs and kill the deer, but only creates enough energy to make a simple wound. It is almost impossible for even the best and most skilful hunters of today's world to hunt a deer with a bow and arrow. As a primary condition, the hunter will not be able to get within 20 metres of a deer (the deer will smell the scent from much further away and run away), and as a secondary condition, even if it is approached, it will not be able to kill the deer with this bow and arrow. As will be explained in detail in the following sections, the people of the San race have solved these two conditions with two very special relationships with nature.

The basic structure of San bows is made of Grewia Bicolar plant. The very dry and dehydrated parts of the plant are not preferred because they are brittle and do not have sufficient flexibility (upper and outer parts), while the very wet and fresh parts (and small parts) are not preferred because they are too flexible and cannot create tensile strength. Which part of the plant to choose is the most basic production quality of the relevant publication and is valued as a representation of craftsmanship. In order to find these parts, the people of the San race touch the tree with their hands, try to feel the moisture and strength with their hands, ask questions to the spirit of the plant, and make discoveries. The bark of the parts deemed suitable is removed by scraping method, both to remove the outer bark structure, which ensures fragility, and to see the defects hidden by the bark (knots, cracks, insect holes, etc.). This scraping process is never transverse to the hole and never involves cutting (transversely or longitudinally). It is only skilfully scraped layer by layer towards the living tissue and thinned layer by layer. A transverse cutting process damages the inner tissue fibres, while a longitudinal peeling process can create different thicknesses in different areas, negatively affecting the quality, strength and lifetime of the final product. Instead, scraping is done from the outside to the inside, from the dry shell to the living tissue. And the properties provided by the biscuit are preserved. The scraping tool can be described as a rigid cylinder, also made of wood, with a longitudinal opening in one part and not filled (Fig. 4).

This tool is a commodity subject to multiple uses, both surprisingly and, as has been found elsewhere in the culture of the San race. The scraper tool also serves as a pipe in which an action similar to smoking tobacco is carried out. The biktis smoked varied widely, but they were found to have pleasurable properties similar to narcotic substances.

The bowstring is attached to one end of the bow with a knot containing a simple loop, and to the other end with a more complex winding. Before the string is threaded, the ends of the bow are strengthened with a paste that is both hardening and adhesive. The paste is made from the resin of the Vachellia Karroo tree, a type of acacia, with the addition of charcoal powder obtained by burning fresh, thin twigs, and is applied both before and after the stringing. With a notch in the trunk of the Vachellia Karroo tree, the sap (resin) of the tree is collected as a high viscosity liquid. The paste is heated together with charcoal powder to make it spreadable and when it cools down again, it gains a strong adhesion and strength.

Figure 4. Scraper (visualised by the author)

After this process, the rope is threaded to the spring with a knot with a ring at one end and putty again. After the other side is puttyed, the spring rope is passed through itself and wrapped tightly for a few turns and then fixed with the leg back suspension ties on the giraffe legs, extending from the ankle to the knee joint, and puttyed again. Giraffe leg ties are strong elements that carry an average load of more than 250 kg in each fibre bundle. The skilful combination of all these details makes the bow both a robust and flexible tool.

In some tribes, the presence of more comfortable and ergonomic grip supportive parts with leather coverings and wraps in the areas where the holding action is performed has been encountered. However, this does not constitute a generalised representation of production.

From the tip to the centre of the bow, people of many San races individualise the bow with ornaments such as tiny patterns, textures, drawings, markings, etc. that make the bow special to them and create belonging. In the culture of the San race, where the relationship established with commodities is very low, the concept of sealing, the relationship of belonging established with existing commodities, constitutes an important behavioural form of the social structure. This state of belonging and sealing, which is encountered even in proverbs, is read as a basic building block at many points such as the protection of order and the determination of borders.

The arrows used together with bows also present a different representation from the rest of the world and from the existing examples in human history. In San culture, arrows can basically be divided into educational and recreational arrows and hunting arrows.

The arrows used in the education, entertainment and games of young children, as well as in the music production of individuals of all ages, are simple structures formed by scraping a simple flat piece of twig, slightly chipping the tip and hardening it in the fire. These arrows are produced from Grewia wood, which is commonly found in the relevant regions.

Nevertheless, in terms of design, function and mechanics, the hunting arrows show a complex structure, a surprising geometrical relationship and a complexity (some San tribes have been observed to hunt with training arrows instead of this arrow) (Fig. 3). Hunting arrows can be described as an innovative product shaped by a complex way of thinking. Hunting arrows basically consist of 3 parts. These three parts, which can be expressed as the main body, the connecting element (beam), and the arrow tip region, are the components of a design organised to fulfil a function based on a cultural formation (Fig. 5). This three-part structure, which exists as a whole at the beginning of the hunting action, transforms into a fragmented form at the end of the hunting action. In this way the total weight (approx. 8 g) is reduced by up to one third.

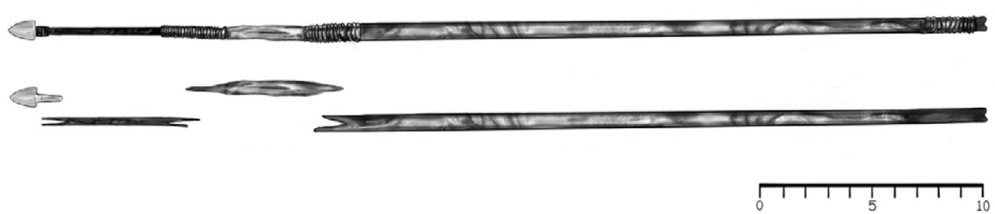

Figure 5. United and Disjointed San Arrow (visualised by the author)

The balancing feathered rear end (three feathers attached to the rearmost part, usually at an angle of 120° to each other), shaped by conventional technology (and forming a general arrow typology), was not seen on the main body. On the other hand, in many San breeds, it has been observed that the rear part (where the hand touches) where the feathers should be, is wrapped to balance the weight. This wrapping process, which is done to compensate for the moment of the arrowhead, which is especially heavy, and the connecting beam, which is relatively heavy, is done with the zurefa suspension tie, where the bowstring is fixed to the bow structure. Puttying process is also seen as a similar technology. The main body is conventionally made of Grewia wood and reed stems.

The ideal material for the connecting beam is “bone tissue”, which, due to its hollow structure, creates relatively little weight and increases the ability to stretch, while being hard and strong due to the essence of the material. Long bones (such as the forearm bone of a panther or a cheetah), especially in the lower parts of the movable joints of predatory animals, are preferred to provide this quality.

The connecting beams, which are skilfully shaped from these bones, are the elements between the arrowhead area and the main body. The most hollow part of the bone is selected and left as a wide section in the centre, and the two ends are sharpened. The pointed ends are inserted into the wooden parts at the front and back, forming a temporary but strong connection. This connecting beam has the strength to hold the whole arrow as a whole (as if it were a single piece) while the arrows are carried in their leather bags, placed on the bow, the bow is stretched, the arrow is shot, and the arrow travels in the air. With this strength, it provides holding-binding for the required time and action. On the other hand, when the arrow comes into contact with the prey, the connecting beam detail, which cannot withstand the force coming from the action-reaction principle, causes the main body to separate from the whole and fall. At the point where the prey is shot, the main body falls to the place of shooting by separating from the beam (although there are rare examples where the holding strength is too much and the main body remains dangling on the prey). This separation of the connecting beam part is the most important feature that allows the arrowhead to remain in the skin for a sufficient period of time. This is because the arrows of the San race are not designed to pierce the internal organs, but to distribute the poison in the body by staying in the skin for a while. In addition to this, the distance of the fall of the main body in the case of the beam dropping the main body provides an idea about the starting point of the direction of escape of the shot and escaping prey and the distance it can travel as wounded.

The arrowhead area can be defined as a penetration point connected to a wooden part (of the same wood as the main shaft). The arrowhead, which penetrates the skin of the prey animal (shallowly), is generally made of metal, but examples made of glass, bone, stone, etc. have also been encountered. The arrowhead can be described as a small flat triangle that penetrates the skin only a few cm deep and does not have the effect of killing the prey by tearing the internal organs or causing vital bleeding. The basic principle of this form is to allow the arrowhead to penetrate the skin of the prey and remain there for a certain period of time. This non-lethal penetration is the main function of the poison integration, enabling the necessary piercing and the corresponding duration of stay in the skin. In order to prevent the arrowhead from breaking away from the moving prey during this period, the main body weight (mentioned in the previous section) was removed from the connecting beam, reducing the load that would negatively affect the holding power of the arrowhead.

The poison that is injected into the body of the prey animal with the arrowhead is a natural extract of the fruit of a local plant. The fruits of the plant Acokanthera oppositifolia look like grapes, at first red in colour, then turning purple to black. These berries, which become poisonous as they darken, grow especially on rocky slopes and are called poisonous bush by the local people. The leaves and root parts are crumbled and applied on the wound in snake bites, and the fruit parts are crushed in the mouth and spat out and applied on the arrowheads. These fruit extracts, which are dissolved by oral enzymes, are a poison that causes a heart attack in a short time when it enters the bloodstream. This poison is applied to the tips of arrows that are not disintegrating and do not cause fatal wounds in the internal organs, and it ensures that the prey does not have a heart attack. When all these components are considered, it can be stated that the design of the bows and arrows of the San race is designed as complementary parts of a holistic structure with its advantages and disadvantages. The function of hunting with poison at the point of impact and fragmentation eliminates the need for high tension force of the bow, thus simplifying the design of the bow and making the design of the arrow more complex. It can be said that bow and arrow design exhibits a cultural existence that is independent from the outside world and completely responds to the relevant function.

5. Conclusions

The history of humanity hosts a wide range from the production to the consumption of the concepts of culture and design. These two concepts, which are constantly intertwined with life itself, have to form a continuous pattern with geography, time, place and humanity. Today, this pattern generally seeks and includes forms of innovative discourse and action. Both the global market, capital relations and new forms developed with technology cause the search for this innovation.

On the other hand, conventional and traditional forms of behaviour, actions and searches constitute the realities that build the basic steps of these innovations. At this point, the correct understanding and definition of conventional and traditional cultures, lifestyles and design and production relations shaped by the influence of these cultures/lifestyles constitute a necessary infrastructure both for design education and design interest at the basic level and for the advancement of generally valid design production relations. Considering today’s world, which is constantly changing, developing and interacting, it is difficult to find pure and pure examples of conventionality and traditionality, but the realities of the San Race people are among the rarest and latest examples of this situation. In this context, it is of utmost importance to learn (and transmit to the future) the daily habits, cultures, rituals, designs, productions and ways of relating to the relevant society. These important features exist in understanding cause-effect relationships, analysing need-response equations, and making sense of the function-design relationship in detail. In this research, an attempt has been made to uncover this interpretation while providing a basic overview of the reality of design, function, ergonomics, geometry, culture, practice, production and natural procedure. From this point of view, patterns related to movement make it meaningful for design students to establish relationships at the basic level, while at the advanced level, it offers an alternative way to explore innovation.

In the light of the data obtained through different research techniques (fieldwork, observation, literature review, visual reading, etc.), it can be easily stated that the San people are subject to a sustainable way of life in harmony with nature even in today’s conditions. From daily practices to special rituals, this way of life manifests itself in a major way. This sustainable way of being at one with nature manifests itself at every point, from spaces to commodities, from dance to music, from hunting to survival relations.

Each design exists within a purely sustainable and territorial effect. Regionalism organically presents a relationship pattern that should already exist, and is spontaneously formed by the tendency of people to use what exists in the environment they have access to. All natural assets existing in the region and its immediate surroundings are the basic constituent of each design. For all of the designs, they are elements that are far from ostentation, which are only a function eliminator, which can be expressed as simple at first glance, but complex thought systems have been created. In each design example, there is an innovative procedure that responds to the relevant function, and it can be stated that this innovative procedure has developed conventionally. In other words, it is seen that the final answers to the existing needs and problems are produced with

innovative solutions in line with the material, production and geometry constraints, starting from conventional and developed traditionally. In each example, it has been observed that there are very special searches / compromises with the material and this situation creates quality. The conventional design-production doctrine of the San race includes a material-production-use practice shaped to discover the qualities necessary to respond to the function. At the most basic level, even a simple binding-knotting-fixing process (binding of the bow tension string to the bow, see Example 2 arrow-bow) is not a random binding-fixing situation, but a practice of making the right material (giraffe sling ties) with the right knitting and joining-winding technique (overlapping winding and production of fixing adhesive). At the point of producing the most accurate answer for every requirement, it can be said that there is a design-production knowledge that has been passed down from generation to generation through culture and teaching. This knowledge creates an equation that includes/ generates innovative answers within a conventional method.

It can be stated that the culture and designs of the people of the San race are different from the rest of the world both in terms of the final product and the way this product is formed. It can be easily said that this reality, which has been formed and created, contains a qualified function and result. It can also be stated that this situation is itself a part of culture and life.

As another result information, it can be said that all kinds of commodity, product, art, ritual etc. productions of the people of the San Race are in a direct relationship with the atmosphere and geography, and both the causes, processes and results of these productions are subject to the atmosphere, geography (related nature). This organic structuring permeates the whole of the relevant reality.

Another result that should be expressed within the scope of this research is related to the design strategy. As a result of the organic relationship they have established with nature, the people of the San Race have discovered the consciousness/reality that there is an answer to everything in nature and have transformed this into a design strategy. When faced with an inadequacy, a problem or a constraint in the design and production steps, instead of bypassing the relevant problem, going around it or taking a step or two back and changing the design, the people of the San Race demonstrate a craftsman behaviour (Sennett, 2013: 292-295). by staying in the relevant position and finding a new answer to that problem from nature, no matter how unorthodox it may be. In this way, other designs following a design or other constraints-problems following a constraint-problem lead to a new innovation. This type of behaviour means designing something else to make the existing design possible, in other words, designing the workbench to make reality possible.

As an epilogue, it can be stated that in the discipline of design, as in almost every discipline, regardless of the time or technological concept, it is important to discover, understand and carry the conventional and the traditional to the future as a way of accessing the innovative. In this context, it is thought that both design students and professional designers looking carefully at the past when they need a new perspective will open a new path to quality and innovation.

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