Early Migration of Chinese Art to the West: The Role of Turks and Arabs

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Posted Date: 1 April 2026

doi: 10.20944/preprints202510.2227.v2

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 doi:10.20944/preprints202510.2227.v2

Article

Early Migration of Chinese Art to the West: The Role of Turks and Arabs

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Abstract

China served as the primary source of novel materials and innovations that significantly contributed to the development of medieval Europe. In this study, I employ an unconventional approach grounded in the mathematics of ornamental arts to trace the trajectory of Chinese goods to the West. Utilizing the concept of the wallpaper group, this research analyzes Chinese ornaments to discern similarities with the artwork of the Arabs and Turkish Seljuks during the 8th to 12th centuries. Furthermore, it elucidates the mechanisms through which Chinese art reached the West, thereby providing insights into the migration of technology.

Keywords: China; Arabs; Turkic peoples; ornaments; symmetry; wallpaper groups; correlation

1. Introduction

The Chinese have a long history in Asia, particularly in the southeastern part of the continent. They were a closed society with moderate relations with their neighbors. There were also periods when the Chinese expanded westward [1]. Their artistic works exhibit similarities to those of the Arab and Seljuk groups, the latter being Turkish peoples from Middle Asia. It is evident that, due to their shared geographical location in ancient and medieval times, these groups had numerous opportunities to influence each other's artistic creations, leading them to favor similar symmetries in the patterns I am examining here to determine their artistic preferences.

The 17 so-called wallpaper groups are periodic patterns that extend across the surface without gaps or overlaps and exhibit symmetry [2]. One characteristic of the cultural group in which a work of art was created is its preference for symmetry, which is reflected in the 17 groups. Such characteristics of a civilization are therefore determined by the distribution of the number of wallpaper symmetries that we observe in its works of art [3]. I have taken up this concept and used statistical methods to examine the tessellated ornaments of some cultural groups. The results show that the Arabs, the Seljuk Empire, and the Seljuks of Rum had similar ornaments, while the classical (ancient) Hellens, Armenians, and Eastern Romans created works of art with comparable symmetry [4]. It is interesting to note that Persia developed its own style independently of both groups [5].

2. Chinese Wallpapers

Throughout history, various civilizations have produced intricate and captivating periodic ornaments. Among these, the Chinese Empire [1] stands out as a beacon of artistic excellence, with its creations adorning ceramics, wood, paper, and fabric. It is plausible that Chinese design, particularly during the *Tang Dynasty* (618˜907), exerted a significant influence through interactions with the Turkic-speaking peoples who shared its land and extensive borders. The Tang Dynasty's forces initially occupied the eastern *Gökturk* territories and later extended their reach to the western region, nearing the Persian borders in Khorasan. In the late 7th century, the Arabs ventured into Transoxiana (Sogdia), establishing their first contact with the Chinese. Subsequently, they engaged in both military expeditions overland and maritime trade. China emerged as a source of porcelain, silk, paper, and various innovations, while simultaneously receiving silver and wool from the West. Consequently, the

 doi:10.20944/preprints202510.2227.v2

origins of trade with Constantinople and subsequently with the West are attributed to the *Silk Road*, which served as the foundation of Sino-European relations. The trade routes can be traced back to the 8th century, although reliable information regarding earlier periods remains elusive. Consequently, we focus on the patterns of Chinese decorative art, characterized by their inherent symmetry, which serves as a distinctive fingerprint of the artisans who created them.

Numerous reports on Chinese patterns have been published, primarily from private porcelain collections [6]. However, I was unable to locate a specific source for Chinese wallpaper. Consequently, I rely on Owen Jones' classic work, *The Grammar of Ornament* [7], which presents ornaments from various significant cultural groups, including China. In this work, I identified 53 distinct Chinese works of art. Additionally, I discovered a classical source of Chinese ornaments, the precious book by Daniel D. Dye [8]. This book is the first on ornaments in the form of repeating patterns and contains 239 examples. Typical examples are illustrated in Figure 1. Six examples were redrawn in black and white and simplified to their essential elements. These patterns are commonly found on porcelain objects, with the exception of the pattern at the top right, which is used on fabrics and paintings. The swastica-like motifs, prevalent in East Asian iconography, symbolize good fortune and eternity. Concurrently, these ornaments and their percentage occurrence are summarized in Table 1.

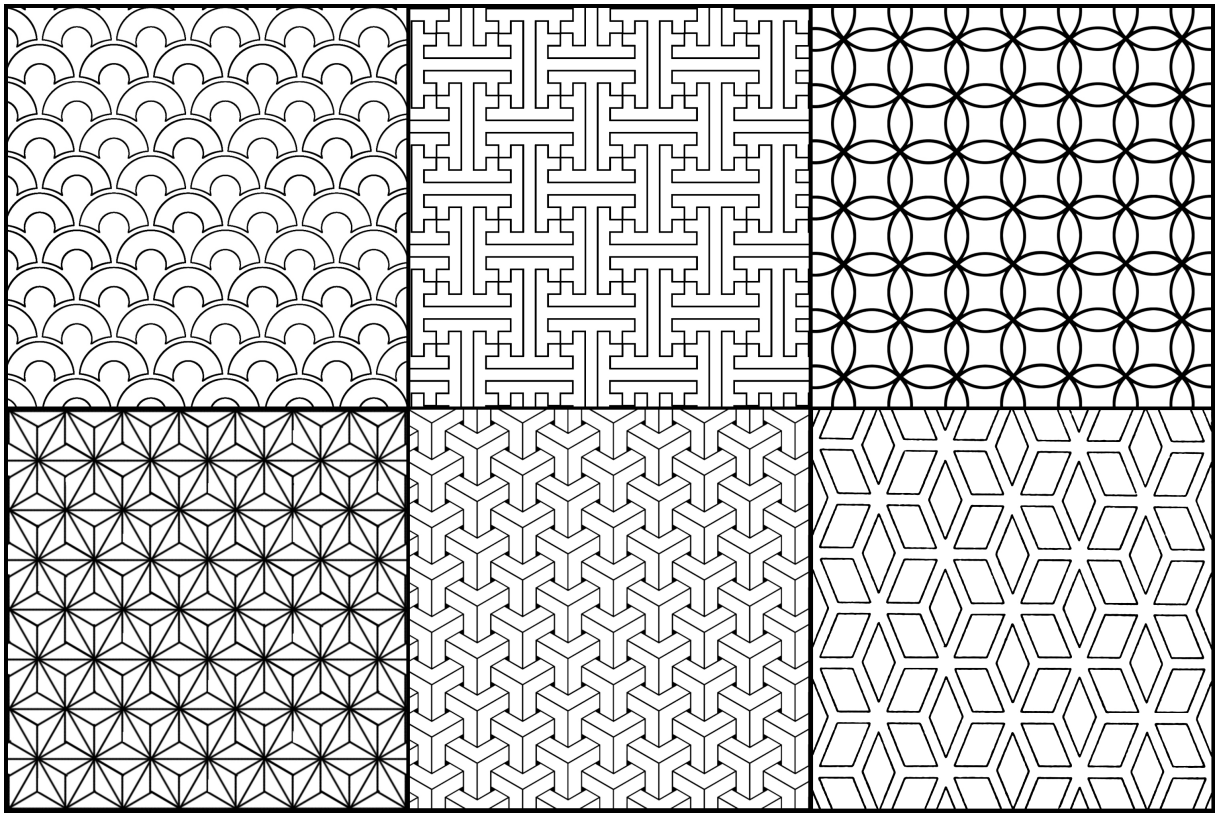

Figure 1. Line drawing of the patterns from Refs. [7,8]. In the upper row, the patterns show the symmetry groups from left-to-right *c1m1, p4gm, p4mm* and in the lower row *p6mm, p3m1, c2mm*.

Table 1. The distribution of symmetry in the Chinese decorations. 292 artifacts are analyzed and divided into 17 wallpaper groups. The table lists the number of occurrences (#) and their frequency in percent (%).

p1	*p1m1*	*p1g1*	*c1m1*	*p211*	*p2mm*	*p2mg*	*p2gg*	*c2mm*
6 / 2.1	1 / 0.3	1 / 0.3	15 / 5.1	8 / 2.8	24 / 8.2	17 / 5.8	9 / 3.1	46 / 15.8
p3	*p3m1*	*p31m*	*p4*	*p4mm*	*p4gm*	*p6*	*p6mm*	# / %
1 / 0.3	3 / 1.0	5 / 1.7	23 / 7.9	82 / 28.1	23 / 7.9	6 / 2.1	22 / 7.5	292 / 100

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3. Results

In my previous research, I explored the symmetry properties of various cultural groups and conducted a comparative analysis by calculating their correlation. For this purpose, I employed several techniques, including *multidimensional scaling* (MDS), *hierarchical cluster analysis* (HCA), the *heat-map* method, and *principal component analysis* (PCA) [5]. Notably, PCA [9,10] emerged as a straightforward approach that I intend to utilize for the current comparison, in conjunction with HCA. PCA is a linear dimension-reduction technique that effectively preserves the most significant features of the data while reducing them to their principal components based on their correlation or covariance structure. Essentially, PCA transforms correlated variables into a new set of uncorrelated variables known as principal components, which collectively capture the majority of the variance within the data.

Table 2 shows the preferences of wallpaper groups in the artwork of nine ancient and medieval civilizations. The symmetries shown as rows are grouped into rotational symmetries, i.e., $n = 1, 2, 3, 4,$ and 6. For each cultural group, the respective symmetry is listed as the number of occurrences (#) and its percentage share (%). This table forms the basis for calculating the correlations between the artworks of these peoples.

Table 2. Distribution of individual symmetry groups in artifacts from nine cultures, presented in numerical form (#) and percentage (%). Rotational symmetries are categorized together. The following abbreviations are used: "Hellens" denotes Hellenistic, "E Roman" stands for the Eastern Roman Empire, "Andalus" refers to the Moorish Kingdom in Andalusia, "Seljuk E" represents the Seljuk Empire, and "R Seljuk" denotes the Seljuks of Rum. The Seljuks of Rum are Muslim peoples who migrated from Asia and are a constituent part of the Seljuk Empire. The Eastern Roman Empire is historically known as Byzantium.

	Hellens	E Roman	Armenia	Arabs	Andalus	Seljuk E	R Seljuk	Persia	China
p1	6/9.8	16/14.0	1/0.8	0/0	1/1.0	1/0.8	1/0.3	9/4.2	6/2.1
p1m1	1/1.6	11/9.7	6/4.9	0/0	0/0	0/0	0/0	8/3.7	1/0.3
p1g1	0/0	1/0.9	0/0	0/0	0/0	1/0.8	0/0	0?0	1/0.3
c1m1	1/1.6	5/4.4	3/2.4	0/0	0/0	0/0	2/0.6	22/10.3	15/5.1
p211	0/0	3/2.6	0/0	8/3.6	1/1.0	3/2.4	4/1.1	4/1.9	8/2.8
p2mm	4/6.6	11/9.7	7/5.7	13/5.8	2/1.9	8/6.4	32/8.8	3/1.4	24/8.2
p2mg	1/1.6	6/5.3	1/0.8	1/0.4	0/0	1/0.8	3/0.8	14/6.5	17/5.8
p2gg	0/0	1/0.9	1/0.8	0/0	0/0	4/3.2	2/0.6	9/4.2	9/3.1
c2mm	4/6.6	4/3.5	2/1.6	29/12.9	2/1.9	14/11.2	31/8.5	63/29.4	46/15.8
p3	0/0	0/0	1/0.8	0/0	1/1	0/0	3/0.8	2/0.9	1/0.3
p3m1	0/0	0/0	0/0	0/0	0/0	0/0	0/0	1/0.5	3/1.0
p31m	0/0	0/0	3/2.4	1/0.4	0/0	2/1.6	7/1.9	1/0.5	5/1.7
p4	1/1.6	2/1.8	15/12.2	1/4.4	28/27.2	12/9.6	30/8.2	11/5.1	23/7.9
p4mm	38/62.4	40/35.1	67/54.5	65/28.9	53/51.5	32/25.6	101/27.8	82/28.1	15/28.3
p4gm	4/6.6	13/11.4	6/4.9	12/5.3	6/5.8	16/12.8	19/5.2	2/0.9	23/7.9
p6	0/0	1/0.9	2/1.6	10/4.4	3/2.9	10/8.0	29/8.0	8/3.8	6/2.1
p6mm	1/1.6	0/0	8/6.6	76/33.8	6/5.8	21/16.8	100/27.5	25/11.7	22/7.5
#/%	61/100	114/100	123/100	225/100	103/100	125/100	364/100	214/100	292/100

Figure 2 presents the principal component analysis (PCA) results for the artistic output of nine cultural groups, including China. The two axes of the figure, labeled as Principal Component 1 and Principal Component 2, are derived from an arbitrary linear combination of the original axes in the PCA calculation. As previously documented, the Hellens, Armenians, Eastern Romans, and Andalusians constitute one group, while the Arabs, Seljuk Empire, and Seljuks of Rum [11] appear to have produced similarly symmetrical works of art. Persia developed its own design before and after the Muslim conquest, as noted in reference [5]. Notably, Chinese ornamentation bears a resemblance to that of the Muslim group, in fact it is very close to the Turkish Seljuks. The terms "Arab art" and "Muslim art" are sometimes used interchangeably. It is important to emphasize that while the Arabs were responsible for spreading Islam in Asia and Africa, Muslim art is the product of numerous cultural groups, not solely the Arabs.

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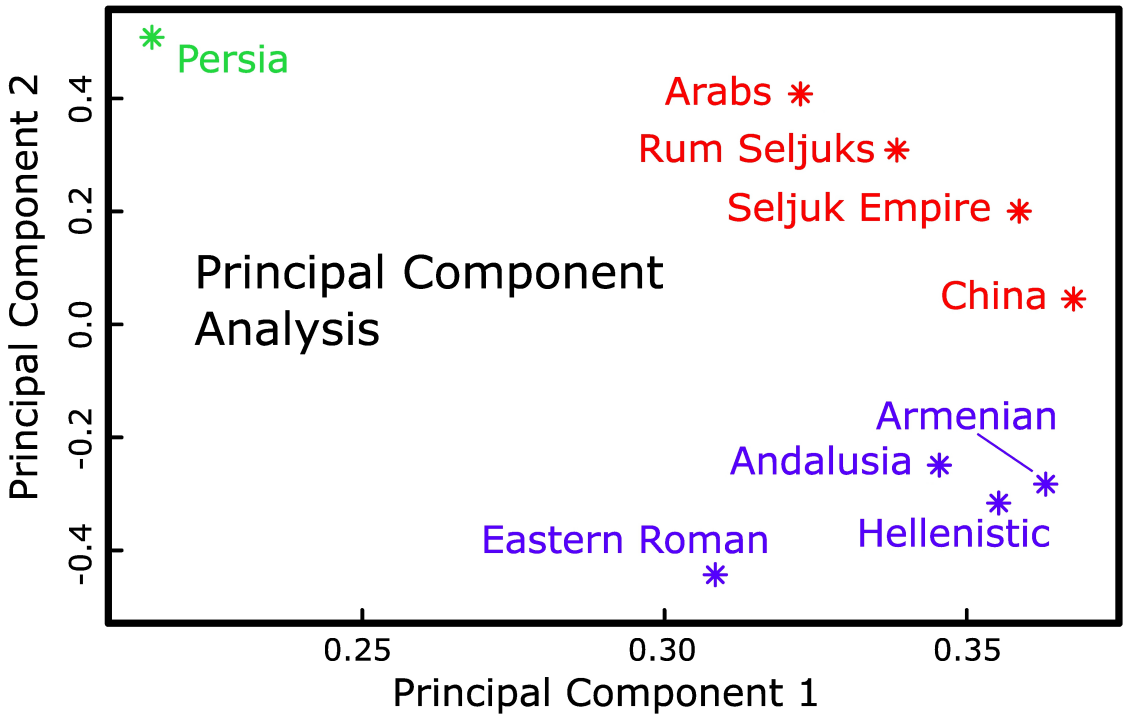

Figure 2. The outcome of the Principal Component Analysis. The occurrences of the wallpaper groups of artifacts enumerated in Table 2 for various civilizations serve as input data for the PCA algorithm. Consequently, the data are reduced to two principal components, enabling the clear visualization of the information pertaining to the symmetry-related practices of distinct civilizations within the 2DIM representation.

The reliability and quality of the PCA can be assessed using the *scree plot* [12]. The scree plot illustrates the relative variances of the individual new variables, the principal components. In other words, the scree plot demonstrates the percentage explanation provided by each principal component to the data. In this case, 73.5 %, 13.8 %, 7.6 %, 2.9 %, and 1.3 % of the information is contained within the first five principal components. Consequently, the representation utilizing only the first two components in Figure 2 accounts for (73.5 % + 13.8 %) = 87.3 % of the data.

To substantiate these findings, we employed the heat-map method to analyze the observations of the nine cultural groups. The heat-map method utilizes a clustering algorithm, as indicated in Ref. [13]. In this study, we utilized the pairwise cosine correlation of the nine medieval groups as the input for the algorithm. Hierarchical Clustering Analysis (HCA), a component of the heat-map algorithm, rearranges both the variables and the observations based on their similarity. Figure 3 provides a visual representation of the resulting data. The degree of similarity, quantified, is depicted through color coding. Red represents the highest (most similar) similarity, corresponding to self-similarity, while blue signifies the lowest (least similar) similarity, as suggested by the algorithm's name. Additionally, the algorithm generates a *dendrogram* for the civilizations studied. This dendrogram is positioned at the top and to the left of the heat map. A dendrogram serves as a direct representation of the results of HCA, an agglomerative data analysis technique. In essence, it illustrates the grouping of variables. Figure 3 demonstrates the aggregation of Muslim (red lines in the dendrogram) and Greco-Roman (blue lines in the dendrogram) civilizations. This dendrogram corroborates the findings presented in Figure 2 and positions Chinese artifacts adjacent to the Turkish Seljuk Empire.

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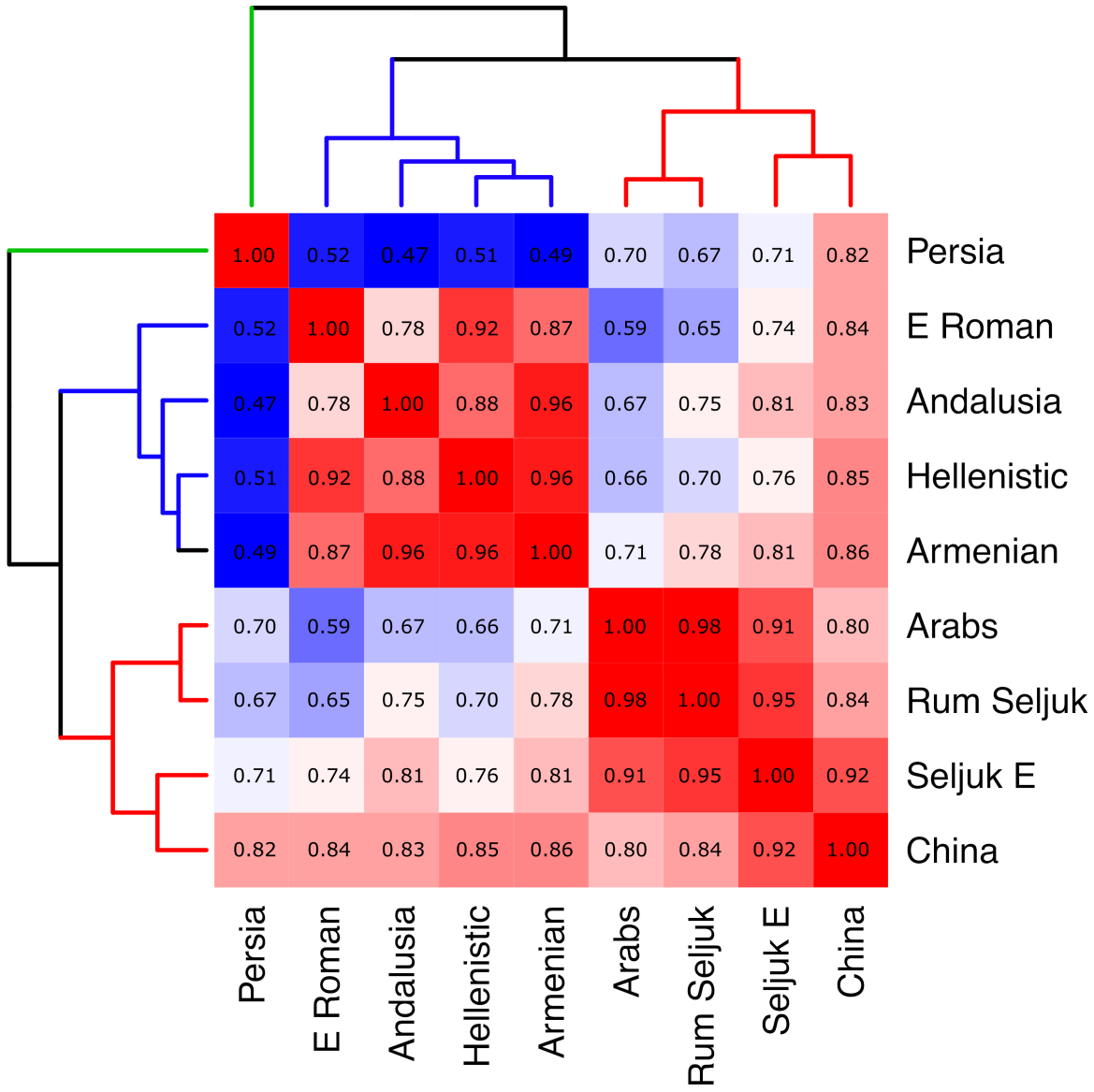

Figure 3. A heat map derived from data collected from nine civilizations, as indicated at the bottom and right of the figure. The color gradient encompasses red, denoting the highest level of similarity, to blue, representing the lowest level of similarity, with white signifying the average value. Concurrently, the algorithm generates dendrograms, positioned at the top and left of the figure. These dendrograms illustrate the evolution of two distinct groups of civilizations (red and blue lines). Notably, China is situated within the red group, exhibiting a close proximity to the Turkish Seljuk Empire. Persia, depicted by the green line on the far left or top, stands out as a distinct entity.

4. Discussion

The results reveal similarities between the symmetry properties of two-dimensional periodic patterns created by the Chinese civilization, Turkic peoples, and the Arabs. The reason for this grouping most likely lies in the shared history of these peoples, especially their shared geography, where their culture has its roots. Since the East and West are connected by the vast Eurasian steppe, we consider the peoples who have inhabited these areas since the first millennium, even though the Chinese have lived in the eastern part for longer.

The Eurasian highlands were historically inhabited by nomadic groups who spoke related Turkic dialects. Subsequently, the rise of Islam in the 7th century led to the prominence of Arab influence in these regions. Chinese literature serves as a valuable historical source for this period, and Wikipedia provides comprehensive documentation on the subject.

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To comprehend the migration of Chinese culture from east to west, it is essential to examine the nomadic peoples residing on China's northern and western borders. Two millennia ago, we encounter the *Xianbei* as a nomadic monarchy that established settlements in the Eurasian highlands, spanning from the northern Black Sea to the southeastern regions of present-day Mongolia. This tribal confederation was characterized by its hostility towards its neighboring tribes. Following the third century, the Xianbei confederation dissolved, giving rise to a similar tribal dynasty known as the *Rouran Khaganate* [14]. Similar to the Xianbei, the rulers of the Rouran Khaganate were referred to as *khagans* or simply *khans*. The term *nomadic feudalism* aptly describes the hostile confederation. Their warriors were typically victorious over their opponents who traveled on foot, as they were formidable warriors who rode on small yet agile horses. The Rouran tribes extended from Manchuria in the east almost to present-day Hungary in the west. While the Rouran tribes exhibited Turkic characteristics, the Xianbei shared similarities with the Mongolian peoples. One indicator of urbanization is the fact that the Rouran are known to have established their headquarters in Gansu, located in northwestern China. However, the Rouran Khaganate met its demise in 552 when the rebellious Gökturks seized control of the confederation [15]. The Gökturk Khaganate is also recognized as the *First Turkic Empire*. They were a clan specializing in blacksmithing and lived as subjugated members of the Rouran society. Upon ascending to power, they were compelled to engage in conflicts with some of their neighbors to secure their vast territories, while simultaneously maintaining amicable relations with the Chinese through interfaith marriages.

Due to internal conflicts, the Gökturk Khaganate disintegrated into western and eastern regions in 603 [15]. The eastern region was subsequently incorporated into the Chinese system following the defeat of the Chinese Tang dynasty's army in 630. Conversely, the Western Khaganate established close relations with Byzantium and engaged in conflicts against their shared adversary, the Iranian Sassanid Empire. At that juncture, the western region was unable to defend itself against the Tang dynasty's western campaign. Consequently, it was also annexed by the Chinese in 658. Despite the collapse of the Gökturks, the Turkic language and culture spread throughout Central Asia. Notably, the Turkic Khaganate emerged as the first steppe empire to establish contact with Byzantium, Persia, and China—three prominent urban civilizations [16].

Following the Tang Chinese conquest of the entire Turkic Khaganate in 658, the *Uighurs*, another Turkic tribal confederation, allied with the Chinese [17]. Their union was solidified through marriage alliances, and by 750, they had reached their peak. As the Turkic-Chinese alliance expanded across Eurasia, the Arabs, inspired by their newly discovered ethnic religion, Islam, embarked on efforts to disseminate their faith beyond the Arabian Peninsula. Their eastern campaign commenced during the *Rashidun* period, spanning from 632 to 661. Omar (634˘644) conquered Byzantine Egypt and engaged in conflicts against the Sassanid Empire in Persia. Uthman conquered significant portions of Syria, Armenia, Khorasan in eastern Persia, and Sindh, thereby sharing borders with India. During their occupation of Persia, they converted the Persians to Islam, and their campaigns of Islamization and Arabization persisted for several decades [18].

The subsequent Muslim rulers belonged to the *Umayyad* Dynasty (661˘750), with their capital situated in Damascus. In the east, they traversed the Onux River to reach Transoxiana, where they encountered the Tang Chinese. Samarkand and Bukhara emerged as pivotal trade hubs. Following this initial encounter, Arab-Chinese interactions persisted through trade and diplomacy via the Silk Road and across the sea. Communication between Arabs and Turks also flourished, particularly after the Turks embraced Islam.

The *Abbasid Caliphate*, the following Arab dynasty, emerged victorious against the Chinese in 751 at the Battle of Talas. Following the withdrawal of the Tang Dynasty from central Asia, the Uighurs assumed the mantle of dominance. During this historical epoch, all the prerequisites for a profound interaction between the enduring Chinese civilization and the flourishing Arab world existed, either directly or through the intermediary of the Turks. Upon reaching their zenith, or Golden Age, after 775 [19], the Abbasid Caliphate established Baghdad as a hub of scientific inquiry,

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cultural enrichment, artistic expression, philosophical contemplation, and technological innovation. A substantial contingent of Arab mercenaries journeyed to the Chinese Tang Dynasty, providing military assistance in the suppression of rebellions. Concurrently, the Abbasids dispatched diplomats to cultivate alliances and forge friendships. Trade and cultural exchange between Baghdad and China experienced a resurgence, resulting in the establishment of bustling trading centers along the trade routes in Transoxiana. The Abbasid Caliphate, through its amicable relations with China, introduced paper, porcelain, and intricately decorated ceramics to Baghdad. The importation of Chinese ceramics catalyzed advancements in local production, fostering imitations. Consequently, Abbasid ceramics evolved into a more significant art form, characterized by an enhanced emphasis on ornamentation. This development fostered a natural convergence between Chinese and Arabic artistic traditions.

Turkish tribal groups can be traced back to names such as the *Kara Khanids*, *Ghaznavids*, and, later in the 11th century, the *Seljuks* [20]. The Silk Road, controlled by these Turkish groups, facilitated trade. In the 11th and 12th centuries, Europeans in Constantinople and beyond benefited from trade with China by importing remarkable inventions such as gunpowder and the compass, which played a pivotal role in European development. At the end of the 13th century, Marco Polo's visit to what is now Beijing represents one of the first direct connections between East and West without intermediaries.

5. Conclusions

In contrast to its closed society and limited contact with neighboring regions, China experienced some relations with the Rouran Khaganate in the north during the early first millennium. These interactions intensified during the Gökturk Khaganate in the 6th century, an empire that was subsequently absorbed by the Chinese. This led to the establishment of military contacts and trade relations with Turkish tribal organizations. On the other hand, Arab warriors invaded Chinese territories in the 8th century. Despite this, China maintained contact with both Turkish tribes and Arab newcomers for an extended period, primarily due to its control of the Silk Road, a vital trade route connecting China and Europe.

This historical development suggests that Chinese societies had already engaged in contact and interaction with Turkish societies in the early centuries. These societies consisted of nomadic tribes and may have facilitated the transfer of Chinese art to European territories in the west. This transfer of art was undoubtedly carried out in later years by the Seljuks, particularly the Seljuks of Rum [21]. Similarly, trade goods also found their way to the West.

The Arabs arrived in the Persian steppes during the Rashidun period, the early Muslim era, before establishing their capital in Damascus. It is therefore plausible that the Arabs came into contact with Chinese art through Turkish tribes, possibly via Turkish traders. Notably, the first significant architectural monument of the Umayyads known today is the Umayyad Mosque in Damascus, which served as a religious shrine for various civilizations, including the Romans and Christians, prior to the Arab conquest in 715. The Arabic ornaments we have examined here originate from this mosque. No Arab works of art from earlier periods are known. Therefore, we conclude that the Arabs brought such works of art back to their homeland from Transoxiana.

The inhabitants of Transoxiana were skilled traders and possessed a distinct culture centered around the significant cities of Samarkand and Bukhara. Situated along the Silk Road, they were governed by a multicultural and cosmopolitan trading organization. Prior to the Arab invasion, Turkish rule in Transoxiana can be traced back to the 560s following the Battle of Bukhara. Transoxiana served as a conduit for the exchange of Chinese goods and cultural influences, facilitating their dissemination to Europe and other regions of Asia. However, due to the limited availability of contemporary artworks, there is currently no concrete evidence to substantiate our assertions regarding the extent to which Chinese elements were present in these two cities during the pre-Arab era. This absence of evidence would have provided direct proof that Chinese culture was the progenitor of Arabic and subsequently Islamic culture. Notably, I am unaware of any significant cultural achievements on the Arabian Peninsula prior to the Arab encounter with Chinese and Turkish cultures.

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Having acknowledged Hellenic art as the progenitor of Greco-Roman and early Christian art [22], we must conclude that the origins of Muslim art can be traced back to early Chinese art. Consequently, Chinese art serves as the precursor to Islamic art, which encompasses Turkish artistic creations in this context. Chinese innovations, including advancements in porcelain manufacturing, silk weaving, historiography (paper), warfare (gunpowder), navigation (compass), and the discovery of new lands beyond the European continent, significantly contributed to the flourishing of these fields. This conclusion was facilitated by the application of scientific and mathematical tools to the study of symmetry in art. The Seljuk Empire played a pivotal role in the development of science and arts across a vast territory stretching from the Asian steppes to Europe via the Middle East and Balkans. Over several centuries, the Turkic nomadic tribe transformed into a formidable empire within an urban environment [20].

Acknowledgments: I thank Fatma Erbudak for valuable comments and critical reading of the manuscript. This work did not receive any support from an external agency.

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