

# Shaping British Digital Art: the Global Network of the Computer Arts Society, 1968–1985

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In the latter half of the 20th century, digital art emerged as a revolutionary field of technology and creativity, redefining the boundaries of artistic expression (Mason 2008). This period witnessed the foundation of the Computer Arts Society (CAS) in London, the United Kingdom, in October 1968 and active until 1985, which became a global platform for fostering the intersection of technological innovation and artistic endeavour (CAS 2024). It brought together a growing community of artists, programmers, engineers, scientists, and researchers from different fields of practice through code writing workshops, conferences, talks, exhibitions, festivals and their PAGE bulletin, and CAS contributed significantly towards the development of British digital art and even the field of global digital art (Arreola, Gardner, and Lenz 2024). Revealing how digital art practices were shaped during this foundational period is not only important for understanding the evolution of this field, but also crucial for contributing to the current debates on global networks of contemporary digital art (Shanken 2016; Harris 2017; Zebracki and Luger 2019).

This short paper presents a work-in-progress research to the central question: How do interdisciplinary and global networks influence the digital art practices within the Computer Arts Society (CAS) from 1968 to 1985?

In order to address the question, this collaborative research, conducted between the Victoria and Albert (V&A) Museum and University College London (UCL), visualises for the first time, the global network of individuals involved within the field, drawing from the V&A's rich repository of historical materials, which comprises of 287 computational art objects and extensive archives that trace the origins of pioneering figures and movements in digital art.

## Data collection and network visualisation

We extracted the data from the original archives, and the dataset was built by categorising individual's attributes based on their roles (e.g., Composer, Artist, Computer Programmer), networks (e.g., Computer Arts Society, American Society for Cybernetics), mediums of work (e.g., Music, Painting, Film), and regions they were based in. For example, one of the founders of CAS, Alan Sutcliffe, was a computer programmer, and he belonged to two networks - Electronic music studios Ltd and Computer Arts Society. His medium of work was music, and he was based in the UK.

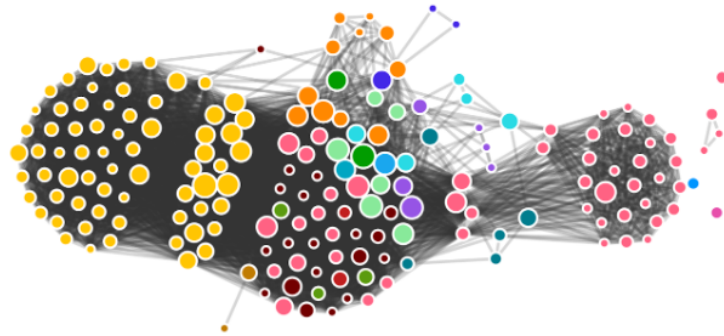
For constructing the network, we assigned a weight to each individual based on their number of attributes, and each individual will be represented as a node on the network graph, with more attributes resulting in a larger node size. This methodological choice quantitatively represents the accumulated characteristics of individuals and allows for a new understanding of the CAS landscape based on its archives and information available. For example, Herbert Brün has a weight of 7, and Lillian Schwartz has a weight of 4, indicating different levels of known attributes and connectivity within the network due to their diverse roles and affiliations.

Edges (or relationships) between nodes were calculated by the number of attributes the two individuals had in common, with a higher number of shared attributes indicating a stronger connection. For example, Eduardo Mac Entyre and Isaías Nougués had 4 attributes in common, as they were both artists based in Argentina affiliated with networks of Grupo de Arte y Cibernética and the Computer Arts Society, showing

a stronger relation. This approach enables the visualisation to reflect on the multiple characteristics and relationships between individuals, facilitating an analysis of multi-layered patterns.

The network was created using the Flourish online platform, colour-coded with the regions they were based in (see Figure 1).

Based in ● Austria ● France ● UK ● Germany ● USA ● Italy ● Spain ● Canada ● Argentina ● Australia ● Brazil  
● Czech Republic ● Netherlands ● Israel ● The Netherlands ● Sweden



**Figure 1.** Network visualisation of the individuals in the Computer Arts Society (1968 - 1985), and the network is constructed based on individual's common attributes, colour-coded with the regions they were based in. Network created using Flourish platform, and the online version can be found from: <https://public.flourish.studio/visualisation/16788992/>

Figure 1 represents a work-in-progress network based on initial data gathered from the archives. The data is incomplete, with more information to be added by mid-May 2024 after further archives review, especially to include important events. Despite missing values, Figure 1 provides an overview of how 185 practitioners are connected based on their category (including artists, engineers, mathematicians or researchers in academia or industry), medium (including dance, music, sculpture, multimedia ect) and groups these were associated with (e.g. Grupo de Arte y Cibernética, Bell Telephone Laboratories, ect..).

## Findings

The network visualisation reveals, for the first time, a global landscape of CAS with widespread influence and diversity of digital arts practices that were happening much wider than the territory of the United Kingdom.

With further analysis of the distribution of individuals across regions and their betweenness centrality based on the visualised network, we are now able to gain new insights into the role of geographic location in the development of digital arts. Betweenness centrality measures the importance of a node in a network, revealing how often it serves as the crucial passage connecting different nodes or clusters together, much like how a bridge connects separate lands (Brandes 2001). We found that the relationship between individuals' regions and their values of betweenness centrality suggests that geographic proximity to centres of technological innovation and artistic communities facilitated collaboration and exchange of ideas.

Specifically, the analysis reveals that individuals from certain regions, e.g., Austria, Canada, Argentina, played more significant roles in the dissemination and innovation of digital art practices within CAS, as indicated by the betweenness centrality values. Table 1 below shows an aggregated overview distribution of regions where the individuals from the Computer Arts Society (1968 - 1985) were based in. It highlights the average betweenness centrality and average attributes, reflecting the network centrality and average characteristics of each 'based in' region, respectively. The table also shows the total number of individuals considered ('No. People') and the distribution across four main categories: 'Artist', 'Engineer', 'Scientist', and 'Other categories', in percentage terms. From the table, we can see the importance of physical and institutional spaces in the development of digital arts, which aligns with previous discussions, such as in Brown and Gere

(2008) and Mason (2008), but it also raises interesting new findings about the diverse contributions and the predominance of certain regions and professions within the Computer Arts Society, and how this interdisciplinary nature and geographical spread of contributors affect the formation of this community?

Based In	Avg Betweenness Centrality	Avg Attribute	No. People	Artist	Engineer	Scientist	Other categories
Argentina	24.51	4.50	6	100.00%	0.00%	0.00%	0.00%
Australia	27.93	6.00	2	50.00%	50.00%	0.00%	0.00%
Austria	117.42	2.33	3	33.33%	0.00%	0.00%	66.67%
Brazil	0.00	2.50	2	50.00%	0.00%	0.00%	50.00%
Canada	109.69	3.20	5	20.00%	20.00%	0.00%	60.00%
France	98.11	2.67	6	33.33%	16.67%	0.00%	50.00%
Germany	74.30	3.45	11	27.27%	9.09%	27.27%	36.36%
Italy	99.01	2.80	5	20.00%	0.00%	0.00%	80.00%
Spain	36.67	6.00	1	100.00%	0.00%	0.00%	0.00%
Sweden	93.41	2.00	2	0.00%	0.00%	0.00%	100.00%
The Netherlands	36.67	5.00	4	25.00%	0.00%	25.00%	50.00%
UK	81.96	2.22	50	4.00%	4.00%	0.00%	92.00%
USA	80.04	2.55	67	5.97%	2.99%	0.00%	85.07%

**Table 1:** An aggregated overview distribution of regions where the individuals from the Computer Arts Society (1968 - 1985) were based in.

For example, Austrian and Canadian artists emerge as influential, with the highest betweenness centralities of 117.42 and 109.69, respectively. Despite a smaller number of individuals based in these countries, individuals from Austria and Canada present a significant influence in connecting different parts of the network, suggesting that artists from these regions were important contributors to the transmission of British digital art ideas and practices.

Individuals from Italy and France also show high betweenness centralities of 99.01 and 98.11, highlighting their roles in the European digital art scene. Their central positions in the network show the importance of European contributions to the development and dissemination of British digital art within CAS.

People from the United States (USA), with a mean betweenness centrality of 80.04, despite having the highest number of individuals (67) based there, indicates a broad but perhaps more evenly distributed influence across its members. This reflects the USA's key role in the British digital art movement, serving as a major hub for technological innovation and artistic exploration.

Argentina and Brazil are shown as predominant connecting countries between CAS and the Latin American digital art community with key figures in the region such as Antonio Berni and Eduardo MacEntyre producing exchanges between CAS and Grupo de Arte y Cibernética in Buenos Aires (with betweenness centralities of 36.67 each).

## Conclusion

In conclusion, the interdisciplinary and global networks within CAS significantly influenced the development and dissemination of digital art practices from 1968 to 1985. The calculated numbers and regional analyses provide a quantifiable measure of these influences, revealing a complex web of international collaborations that drove the digital art movement forward.

More specifically, our findings demonstrate the importance of international and interdisciplinary networks in shaping British digital art practices within CAS. Artists from regions outside the UK, such as Austria, Canada, Italy, and France, were very important bridges in connecting across the network, thus facilitating the exchange of ideas, techniques, and innovations. This global exchange contributed to the vibrancy and diversity of digital art practices, highlighted the role of CAS as a connector in the international digital art community.

This work-in-progress network visualisation of previously unstudied archives contributes to the understanding of CAS's evolution and global reach and with it the history of British digital art for the first time in this way. The emergence of British digital art was not an isolated phenomenon only within the UK, on the contrary, it was linked to the global and interdisciplinary exchanges facilitated by CAS from multi-layered perspectives. These attributes and interactions of individuals were important in fostering a culture of innovation, where the fusion of computational processes and artistic vision led to the creation of new art forms.

By continuing our data gathering and research, we hope to contribute to the scholarly understanding of digital art's origins with additional and more detailed uses of network visualisations to map the connections within CAS against case studies. Our future work will contextualise these findings within the broader narrative of British digital art's evolution and offer a new perspective on the development of British digital art.

As we uncover more about the mediums, networks, and categories of practitioners we will be able to uniquely map out the relationship between the arts and sciences and the role of research institutes and industry labs in the development of digital art in Britain. This will be especially meaningful to trace and study the role of regional geographic proximity as an influence on digital art practices within CAS. We expect also to delve deeper into the pronouns used by and refer to the practitioners in our sample as well as their approximate birthdays. We currently have this demographic information on just under 30% of individuals, but with our further planned data collection and modern machine learning methods that enable name-to-gender inference, we may be able to reflect on how personal characteristics influenced and changed the interdisciplinary networks of digital art since the 1960s.

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