

Networks, Complexity and Its Applications / MAS 961

Class Project: Chicago World's Fair

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1893 CHICAGO WORLD'S FAIR

The World's Columbian Exposition, held in Chicago in 1893, was a major world event that brought together designers, artists, engineers, academics, and politicians from around the world. Like many World's Fairs at the turn of the century, it established its city and country as preeminent industrial powers. It forged many new connections between the professionals and cultural elite who banded together to create the fair, and exposed a vision of the ideal city to 27 million visitors, nearly half the US population[1]. The convergence of creative minds produced a number of friendships that would endure beyond the closing of the fair, however, several clashes emerged as stylistic approaches differed and visions for the future were debated. The dynamic social network that resulted from the fair illustrates the collaborative nature of architectural practice at the turn of the 20th century. The links that formed around this singular event influenced the direction of planning, design, and engineering of American cities for decades to come.

A VISIONARY AND VERSATILE HUB

To build this social network, our group used the 1893 Chicago World's Fair as our "seed," with its Wikipedia article and the book *The Devil In the White City* as our main background sources. From the book we identified a number of important figures in the Fair's development, particularly Daniel Burnham, chief architect and overseer of its construction. Many of the links in this preliminary network were taken directly from the text; architects and engineers were linked through partnerships, collaborations, rivalries, mentorships, and friendships [see image 05]. The form of this network resembled the hierarchy of the Fair itself, with Daniel Burnham acting as a hub for all participants [see image 01].

Burnham's business manner and grandiose ambitions greatly influenced the structure of the network, which centered on an all-star roster of the most successful architects in the country. This early cohort of five (Hunt, McKim, Peabody, Van Brunt, Post) was a tight clique of classically trained architects, connected through mentorship or common tutelage at the L'Ecole des Beaux Arts in Paris. However, they also were all based on the East Coast, which many of the fair's patrons

viewed as a betrayal on Burnham's part of his Chicago roots. Thus, political pressure expanded his network to include five Chicago-based firms to counterbalance this East Coast bias. Unknowingly, they were also elevating Western ideas of design and form by promoting the likes of Dankmar Adler, Louis Sullivan, and William LeBaron Jenney.

EXPANDING THE NETWORK

To expand our investigation of network connections to Daniel Burnham and the Fair, we used trackback links from the Fair's Wikipedia entry, discovering dozens of artists and historical figures for whom the fair was a major milestone. Building a master list of important figures, we ran a script searching for hyperlinks connecting their respective Wikipedia pages. This expanded our network considerably, pointing to a strong collaboration network of sculptors, architects, and engineers [see image 03]. The structure of the network indicates the methods of work undertaken; specifically how often (and seldom) these clustered professionals would interact.

In particular, a generation of American artists gathered to apprentice under Burnham and the elite of the fair. The immense scale of the Fair's buildings and the employed style of neoclassical design meant there was a great deal of space to fill with artwork and sculpture. Thus stylistic choices also supported this burgeoning cohort of young designers, giving them work and connecting them with each other; on the network they radiate from the elderly core of architects but form links with each other through later collaborations [see image 04].

Rivalries were inevitable as influential figures struggled to dominate the fair, and the network shows how close these competitors were to one another. Within the engineering cluster, Thomas Edison famously challenged George Westinghouse and Nikola Tesla for a commission to light the fair, but lost the bid due to the cost efficiency of Tesla's alternating current system. Another rivalry emerged from the links between Burnham, John Wellborn Root, Adler and Sullivan. Their firms were longtime rivals in the Chicago scene, and the traditional style of Burnham and Root often clashed with the progressive and modern style of Sullivan and Adler. Sullivan was a loud detractor of the conservative design choices that pervaded the fair, and Adler coveted Burnham's directing position, to the point of nearly refusing to join the commission

These struggles over the direction of the fair had national implications; Westinghouse and Tesla would prevail in making alternating current the standard across the United States, while Burnham was able to spread his vision to urban plans for Denver, Chicago, and Washington DC. Edison's

direct current standard never took hold on a large scale, and Adler and Sullivan's firm collapsed soon after the fair.

A COLLISION OF EAST AND WEST

From the social network around Daniel Burnham and his Fair, there emerges a clear distinction between people from the American East and West and the close interaction that took place amongst those from similar regions [see image 02]. Figures representing the American East, particularly Boston and New York, form a large well-defined community with multiple cliques amongst themselves.

Major designers from the East such as Richard Morris Hunt, Augustus Saint-Gaudens, and Frederick Law Olmsted employed multiple apprentices, many of whom started their own firms. Beaux Arts traditions from Europe filtered through these networks of apprenticeship, greatly influencing many of the fair's designers, but so did idiosyncratic styles like "Richardsonian Romanesque." This style, synthesized by American architect Henry Hobson Richardson from his studies in France, used heavy massing and textured medieval-looking stone walls. Some of his apprentices (White, McKim) would retreat to Beaux Arts forms, but others like Sullivan and Frank Lloyd Wright would take his ideas to extremes in the Prairie School of architecture.

The clustering of the Eastern nodes shows cliques of high density while the nodes representing Western participants have fewer connections amongst themselves but more direct links to the network's hub, Daniel Burnham. Western architects like Sullivan and Wright, though often educated alongside their Eastern peers, maintain fewer links to the conservative Eastern bloc, which reflects their stylistic development distinctly separate from their conservative peers. Yet the links that remained were important in developing technologies that would enable modern forms in both Chicago and New York – the steel frames and safety elevators that made skyscrapers a viable investment.

The Chicago World's Fair brought together architects using a variety of different styles, but the overall design of the fairgrounds was strongly unified around a neoclassical vision. Extensive use of columns, domes, and vaulted ceilings, ornate sculptural ornamentation, symmetry, and balance characterized the buildings of the central Court of Honor. White stucco, applied with spray paint (an invention of the fair's contractor), brought each building under the same color scheme, with the notable exception of Sullivan's polychrome Transportation Building.

Daniel Burnham's ability to synthesize these stylistic differences into a common plan made him a critical node of the network, and part of our analysis involved separating this hub to understand the network's behavior without it [see image 06]. Once this hub is removed, Fair participants from the West appear more tightly connected, while those from the East are dispersed and cliques exist only at the periphery. Without Burnham, the cluster around Louis Sullivan becomes more pronounced, an emerging progressive aesthetic that inspired many western architects at the time. Indeed, the success of the fair's conservative, European-influenced design only further alienated the Western architects of the time, who eventually developed the Prairie School as an alternative, authentically American style in response. Frank Lloyd Wright, its most famous proponent, would become the leading architect of the 20th century, while Burnham's City Beautiful movement barely outlived Burnham himself.

ISOLATED CLUSTERS

A notable feature of this social network is the isolation of two sub-groups: engineers and women [see image 03]. Among the engineering cluster, George Westinghouse maintains the only direct connection to Daniel Burnham. Despite steep competition from Thomas Edison, Westinghouse won the bid to illuminate the Fair, which put him in close contact with the important figures of the Fair's implementation. From George Westinghouse, we see links to several collaborators who formed his team including the radical inventor Nikola Tesla. Although Tesla was not directly connected with Burnham, he once collaborated with architect Stanford White who was deeply embedded within the clique of Eastern architects participating at the Fair.

The women involved with the Fair form a linear connection outside the dense cluster surrounding Burnham. America's first professional, female architect Sophia Hayden Bennett was commissioned by Burnham to design the Women's Building at the Fair. Her sister in law, Bertha Palmer, provided support for the work as well as forming a three-clique with interior designer Candace Wheeler and art curator Sarah Tyson Hallowell. This branch of women remained separate from the dominant participants of the Fair; however, their contributions would influence future expos and increase involvement from women in historically men's social circles. Despite this, the network shows that those connected to important figures were predominantly wealthy, educated, men. The few working-class figures we identified (including the laborer Elias Disney and legendary train engineer Casey Jones) are not connected at all to the bulk of the network.

ENDURING FORMS

The design of the Chicago World's Fair synthesized Eastern ideals of neoclassical buildings and statues, although their application on the urban scale was distinctly Western. A particular clique within this social network formed such a tight bond that their collaboration continued after the Fair and maintained several connections to networks participants. Daniel Burnham, Charles Follen McKim, Augustus Saint-Gaudens, and Frederick Law Olmstead saw their ideas come to fruition in the McMillan Plan of Washington D.C., fully realizing their vision in the National Mall. The City Beautiful Movement emerged from the ideas within this social network, and its influence can be seen today in major public buildings in Cleveland, Columbus, Denver, Des Moines, and Montreal, as well as campus plans such as MIT.

The crafting of the Burnham Plan for Chicago also followed the Fair's success, and those close to Burnham continued to work with him until his death in 1912. While Beaux Arts and City Beautiful traditions were soon eclipsed by Modernism, the ambition of Burnham's urban design plans continued to influence both modern and post-modern architects and city planners.

CONCLUSION

The Chicago World's Fair captured the zeitgeist of American culture during the late 19th century, and established a body of designers who would dominate art and architecture for decades to come. It also catalyzed counter-traditions that endured even further and set the stage for distinctly American styles. Small-scale rivalries and collaborations mirrored massive technological and cultural advances. The process of building, visualizing and analyzing the social network of the Fair's contributors reveals a story of East/West collision, enduring collaboration, and surprising interactions between politics, design, and engineering.

[1] http://en.wikipedia.org/wiki/World's_Columbian_Exposition

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