Appendix

Appendix 1 – Dropout frequency for each Prize Year
Appendix 2 – Time Period Networks

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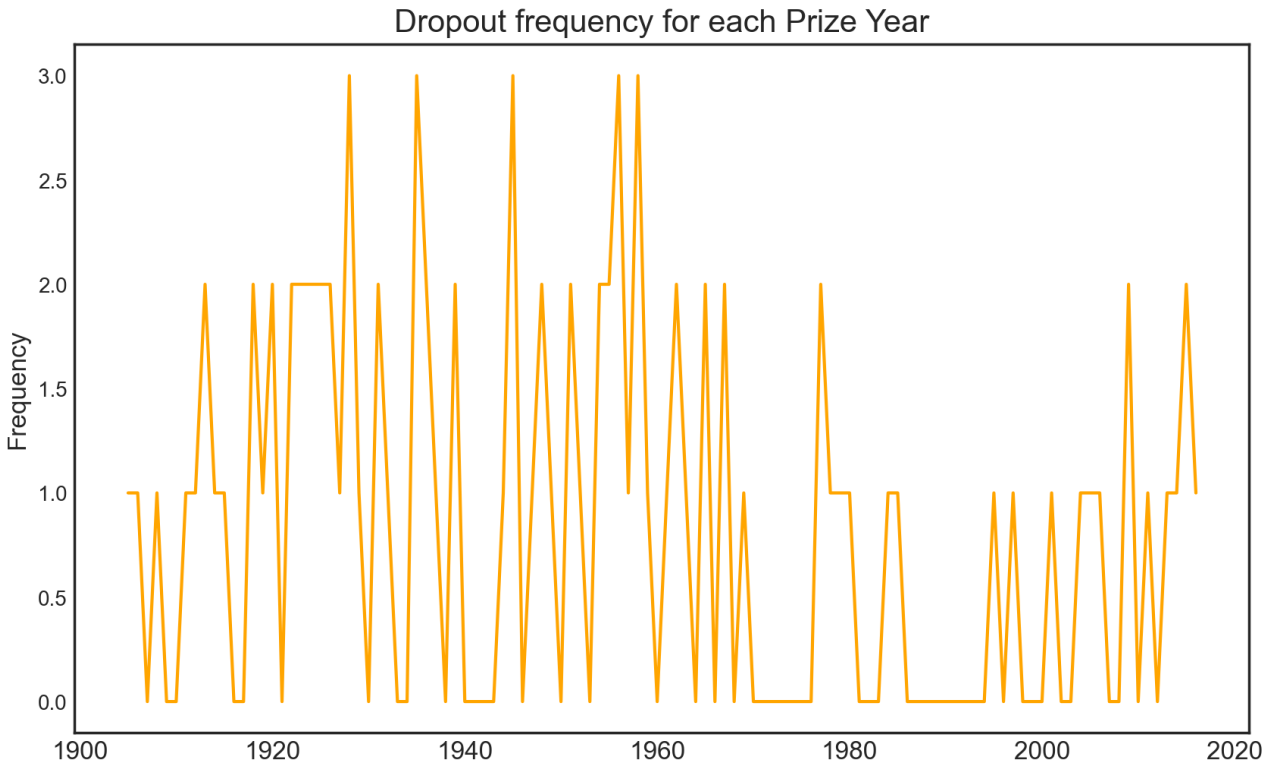


Appendix 2 - Time Period Networks

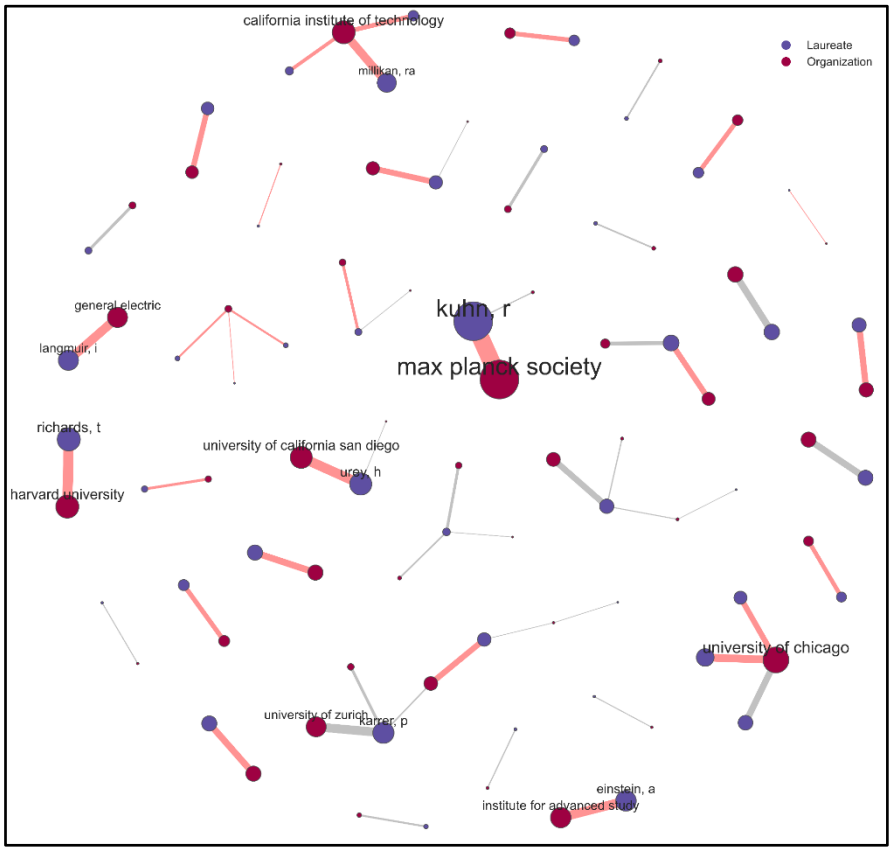
In this appendix, we examine the time period networks based on the findings of Heinze, Jappe, & Pithan (2019), that the national dynamics regarding the Nobel prize has shifted over time (See Section 2.2).

The time periods are -1939, 1940-1969, 1970-1999, and 2000-. For each time, we include the entire careers of the scientists who won the Nobel prize during the given period. For each time period, we present the bipartite-, laureate projection-, and organization projection network. Furthermore, we will use weighted edges to indicate the strength of the ties. In the bipartite network, the edge weights indicate how many publications a laureate has published at a given organization. In the laureate projection network, the edge weights indicate how many organizational affiliations two laureates have shared. In the organization projection network, the edge weight indicates how many laureates two organizations have shared an affiliation to. In all the networks the node size depends on the sum of the edge weights. In all the bipartite networks, edges are colored red if the laureate won the Nobel prize when they were affiliated with the organization.

Appendix 2.a - From 1939 and earlier

The first period consists of 44 laureates and 47 organizations. We plot the bipartite network with weighted edges.

Network a1: Weighted Bipartite Network - Before 1939



It is obvious that there are noticeably fewer nodes in Network a1, as opposed to the overall bipartite Network 1. Interestingly, the nodes also seem very isolated, compared to the three networks from section 5.1. Neither laureates nor organizations have more than 3 affiliations, which is in stark contrast to e.g. the 34 affiliations of Schally in Network 1.

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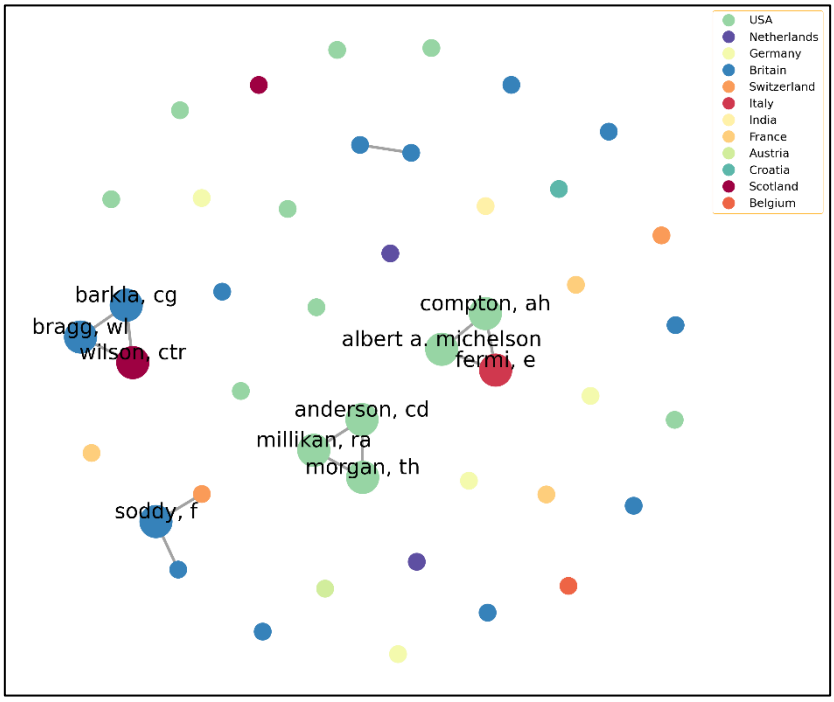
Below, we plot both the laureate- and organization projection. First the laureate network (Network a2).

Network a2: Weighted Laureate Projection – Before 1939



Then the organization projection (Network a3).

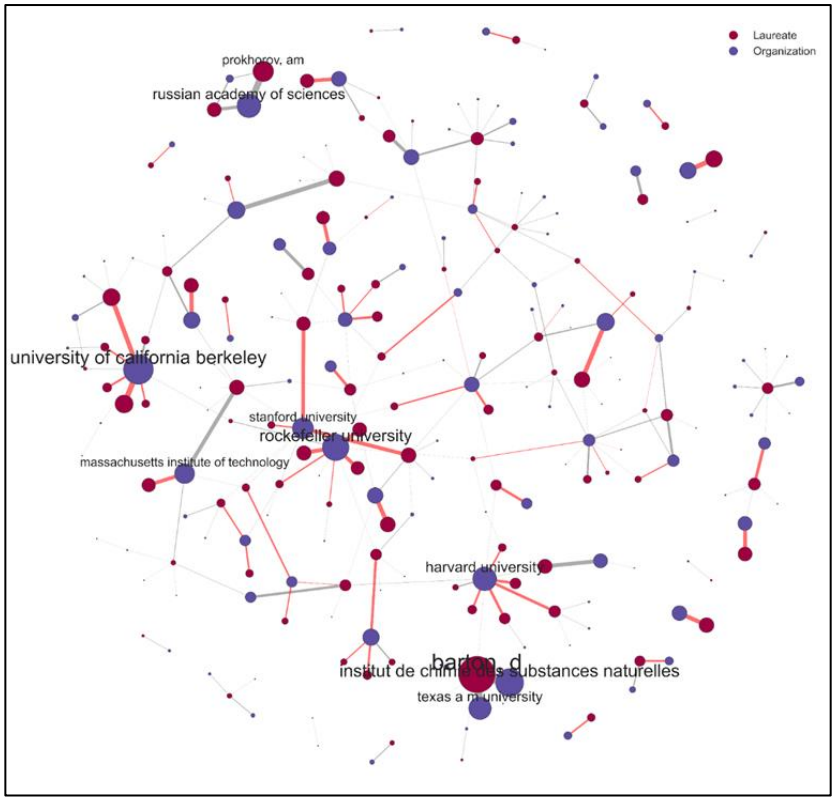
Network a3: Weighted Organization Projection – Before 1939

Examining the laureate- and organization projection, we see that the European organizations are most central in the network, even though there are more US organization nodes. Both the bipartite network and the projection are characterized by a sparse wiring-diagram, which poses the question, if it is even meaningful to talk about a global scientific field here.

Appendix 2.b - From 1940-1969

The second period consists of 108 laureates and 128 organizations. We plot the bipartite network for the period.

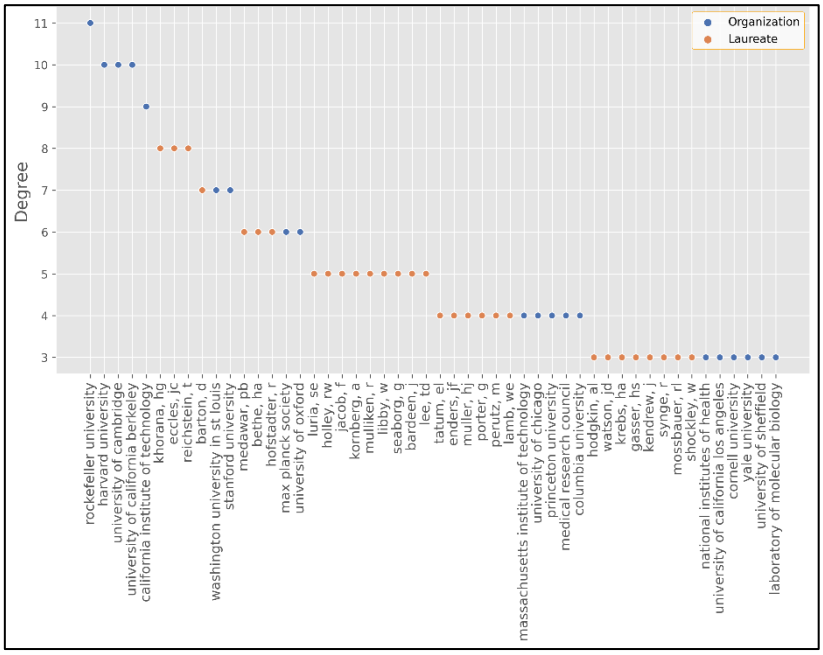
Network a4: Weighted Bipartite Network - 1940-1969



Though still somewhat sparse, we see a much more interconnected network in *1940-1969* than we did in the period *before 1939*. We notice the isolated Russian cluster in the top left of the network, with the Russian Academy of Science in the center.

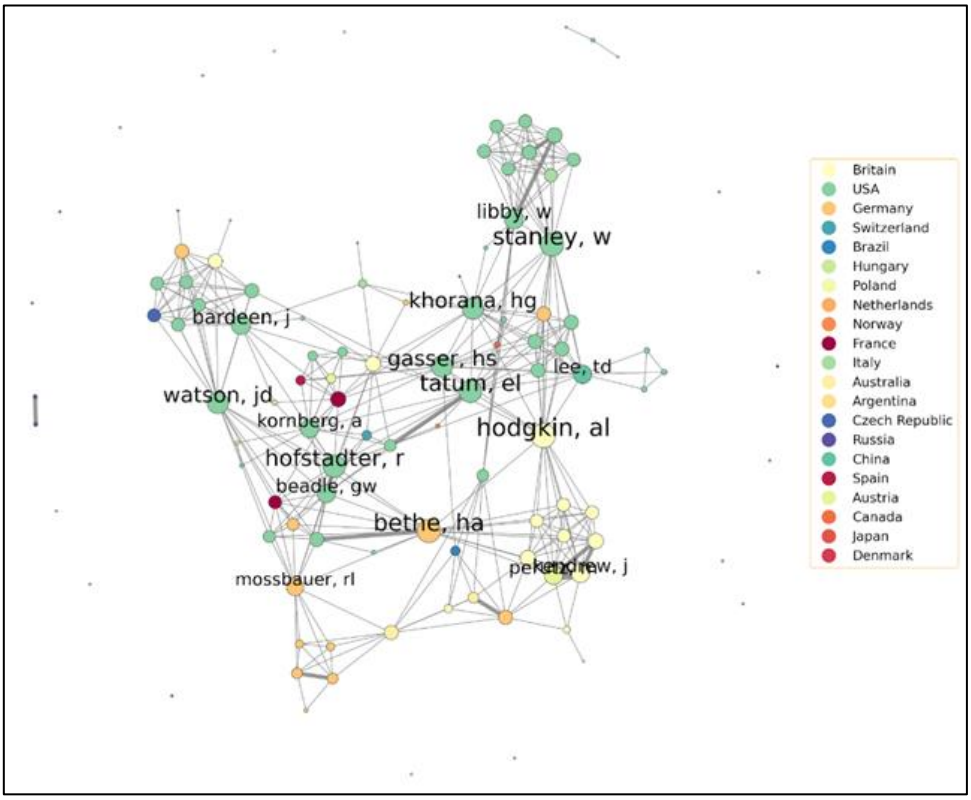
We plot the degree distribution of Network a4 in Figure a1.

Figure a1 – Top 50 Highest Degree Nodes from Network a4



We see that both laureates and organizations have a higher degree than in *before 1939,* with most of the nodes now having at least a degree of 3 or above. We plot the laureate projection for the period *1940-1969* in Network a5.

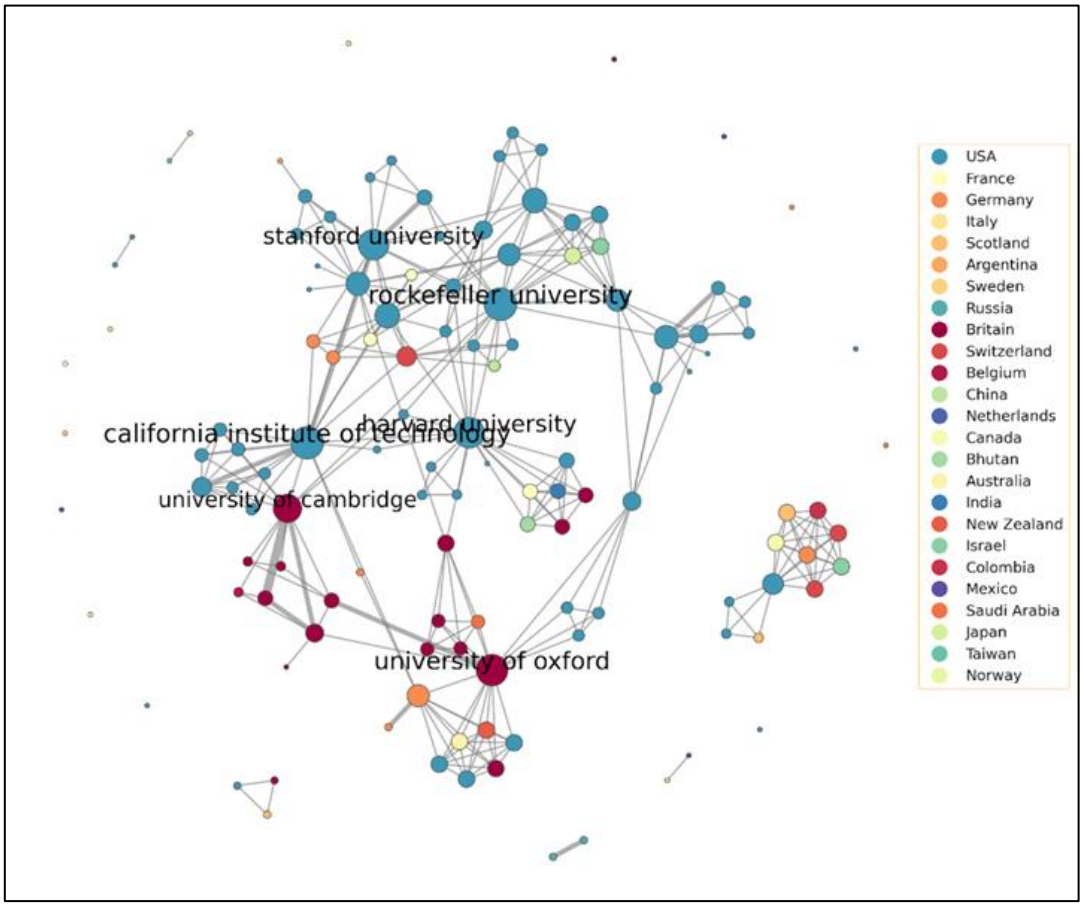
Network a5: Weighted Laureate Projection - 1940-1969



In this time period, we clearly see national clustering with regard to the laureates' affiliations. With US laureates being the most prevalent nodes in the network, we see a tightly connected US cluster in the top of the network, a tightly connected British cluster in the bottom right, and a smaller German cluster in the bottom left. We identify Hodgkin and Bethe as very central nodes with regard to connecting the national clusters in the network, and Stanley as a central node for connecting a US cluster to the main network component. We also notice two strongly connected Russian nodes that are isolated from the main component.

We plot the organization projection for *1940-1969* in Network a6.

Network a6: Weighted Organization Projection - 1940-1969



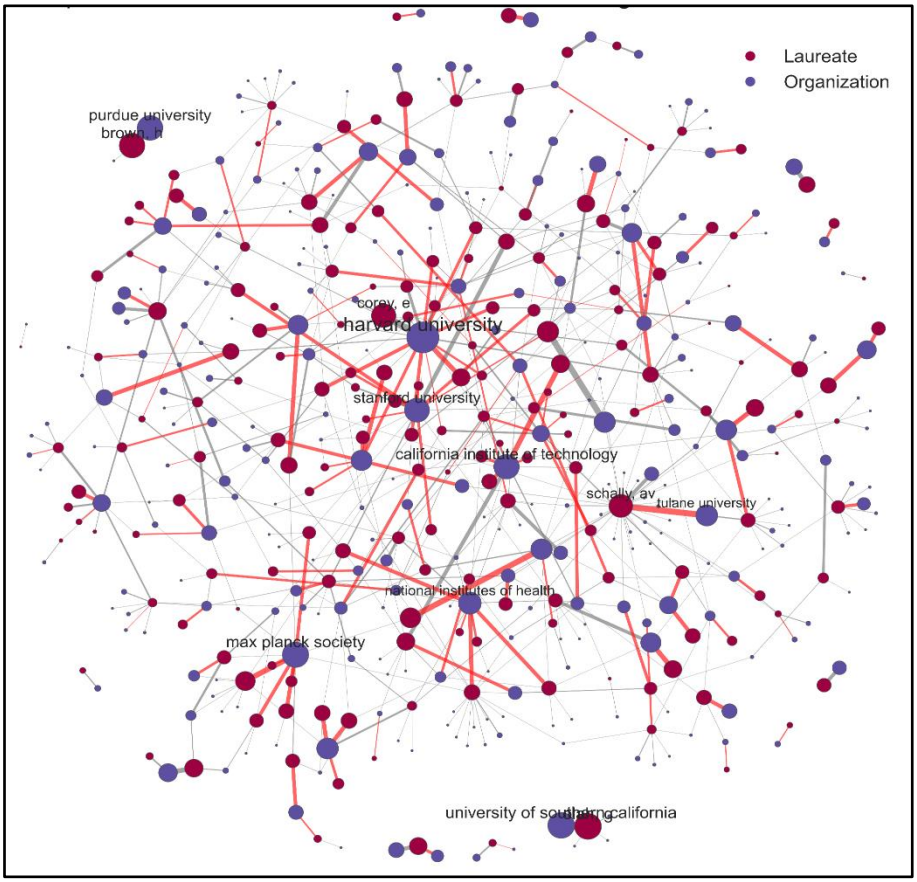
Compared to the period *before 1939*, we see that the US organizations are still the most prevalent nodes, but in Network a6 they are also much more centrally positioned in the network. We see a clear distinction between British and US nodes, with the British

organizations clustering in the bottom left. Furthermore, because of the weighted edges, we see that the tie strength is much stronger internally than externally in the British cluster.

Appendix 2.c - From 1970-1999

The third period consists of 181 laureates and 294 organizations. We plot the bipartite network for the period.

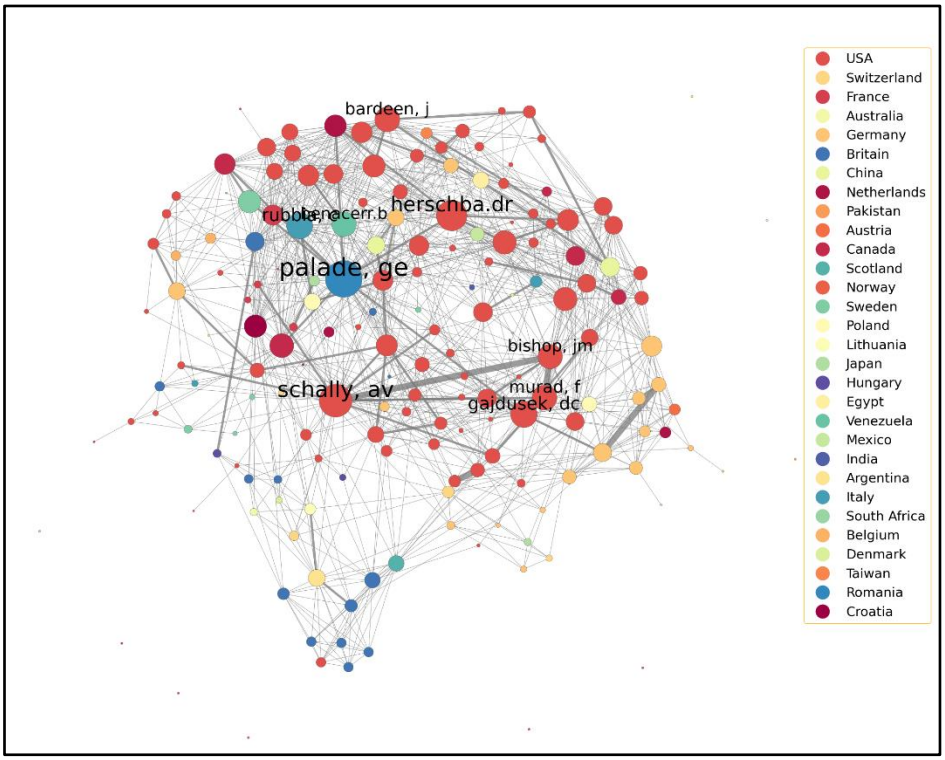
Network a7: Weighted Bipartite Network - 1970-1999



We observe that most of the red edges, indicating the Nobel winning affiliation, are also highly weighted edges. It would appear as if many of the laureates publish most of their publication at the organization with whom they are affiliated when they win the prize. We observe Schally, who was the most connected laureate node in the bipartite Network 1. Due to the weighted edges, we can see that even though Schally was affiliated with 34 organizations, he did most of his publications work at Tulane University, where he also won the Nobel Prize. We see that Harvard and Stanford are positioned as some of the most central nodes, just as in the bipartite Network 1.

We plot the laureate projection for the period *1970-1999* in Network a8.

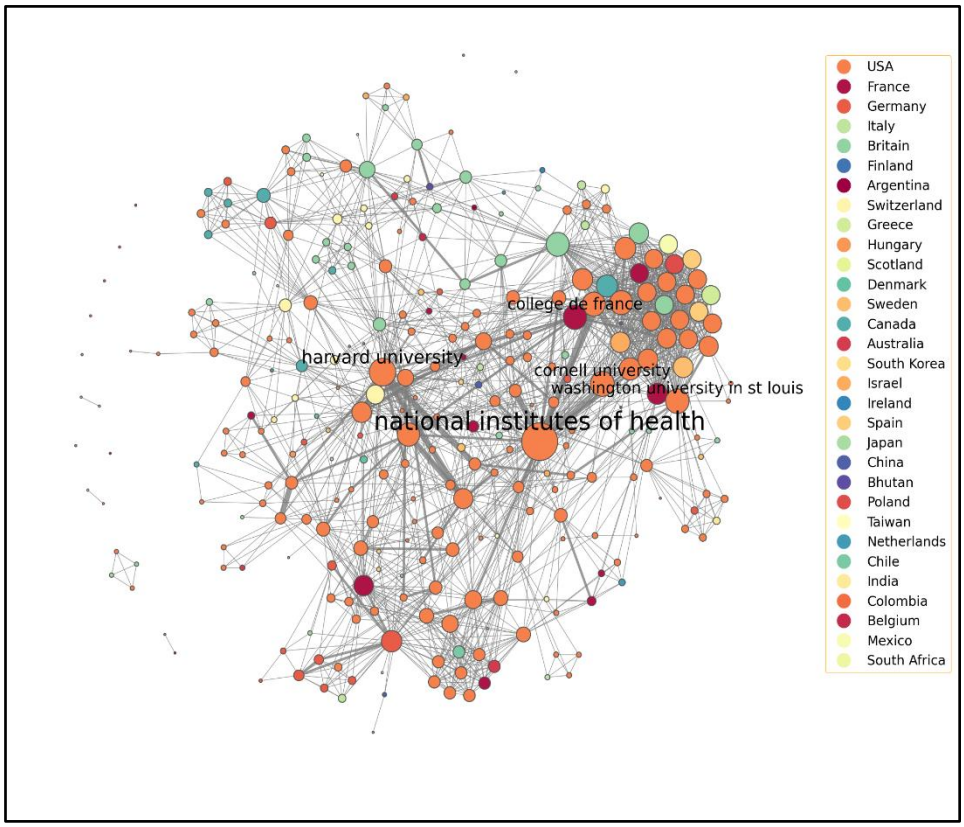
Network a8: Weighted Laureate Projection - 1970-1999



As in Network 2, we see that Palade appears as the most connected node in the laureate projection, while being less central in the bipartite network (Network a7). This was also the case when we did not account for the time periods in Section 5.1. Network a8 has a more hairball-like structure than the laureate projections from the previous periods. It is difficult to make out a clear cluster, aside from a smaller British cluster in the bottom, and the contours of a German cluster to the right. In opposition to both the *before 1939* and *1940-1969* laureate projection networks, it is clearly the US laureates who are placed centrally in Network a8, with the British and German laureates occupying more fringe positions. We also notice that there are no Russians present in Network a8, not even in the outskirts as we saw in the *1940-1969* laureate projection (Network a5).

We plot the organization projection for *1970-1999* in Network a9.

Network a9: Weighted Organization Projection - 1970-1999

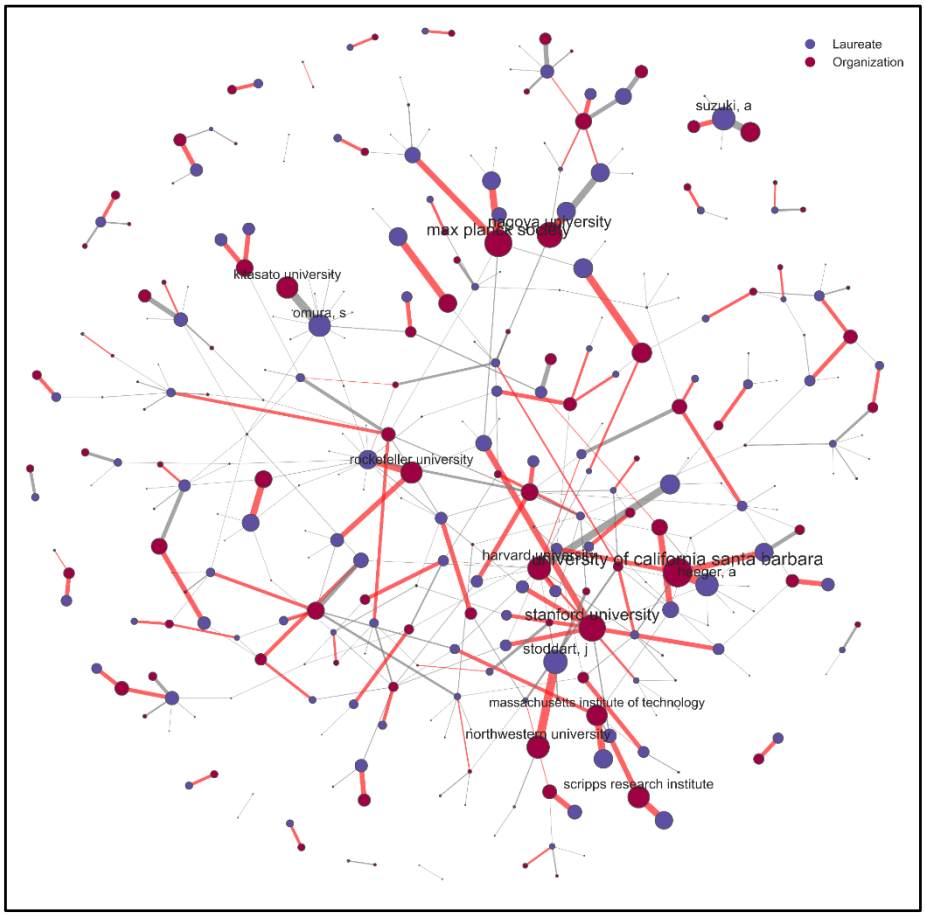


As with Network a8, Network a9 is much more intertwined than the organization projection from the previous time periods. We clearly see that US organizations are placed centrally in the network, with the *National Institute of Health* being the most central organization.

Appendix 2.d - From 2000 and after

The fourth and final period consists of 118 laureates and 202 organizations. We plot the bipartite network for the period, Network a10.

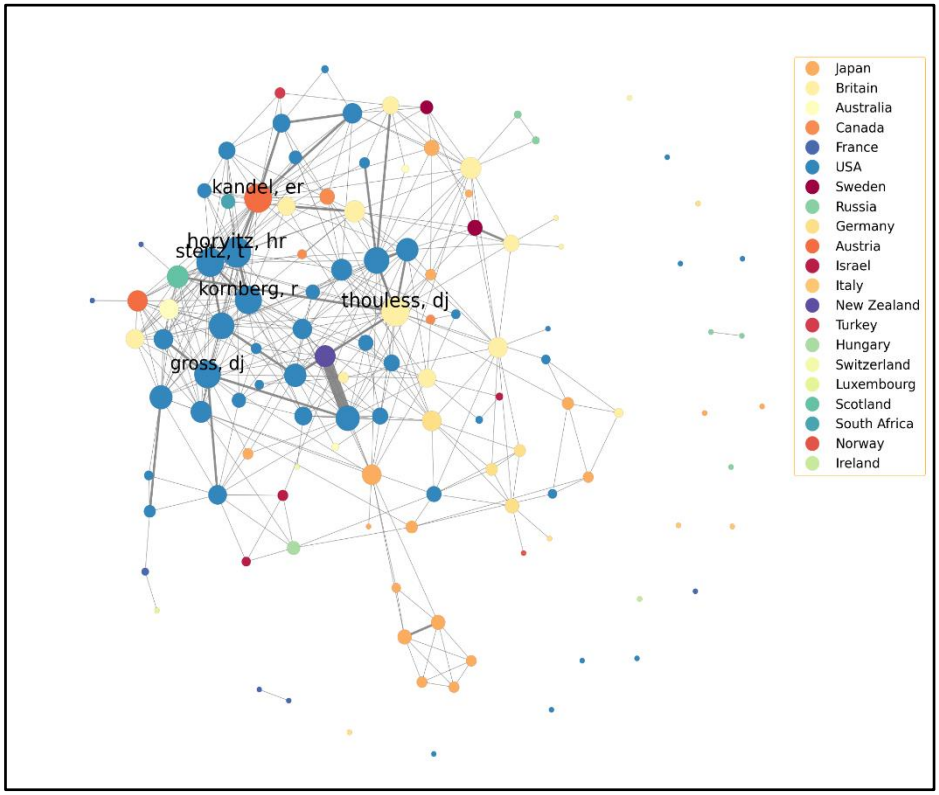
Network a10: Weighted Bipartite Network - 2000 and after



Once again, we notice that most of the red edges are highly weighted edges. This indicates that the laureates have published most of their work at the organization with whom they won the Nobel prize. We see that some of the same organizations are central nodes in nearly all of the time periods, like Harvard and Max Planck Society

We plot the laureate projection for the period *after 2000* in Network a11.

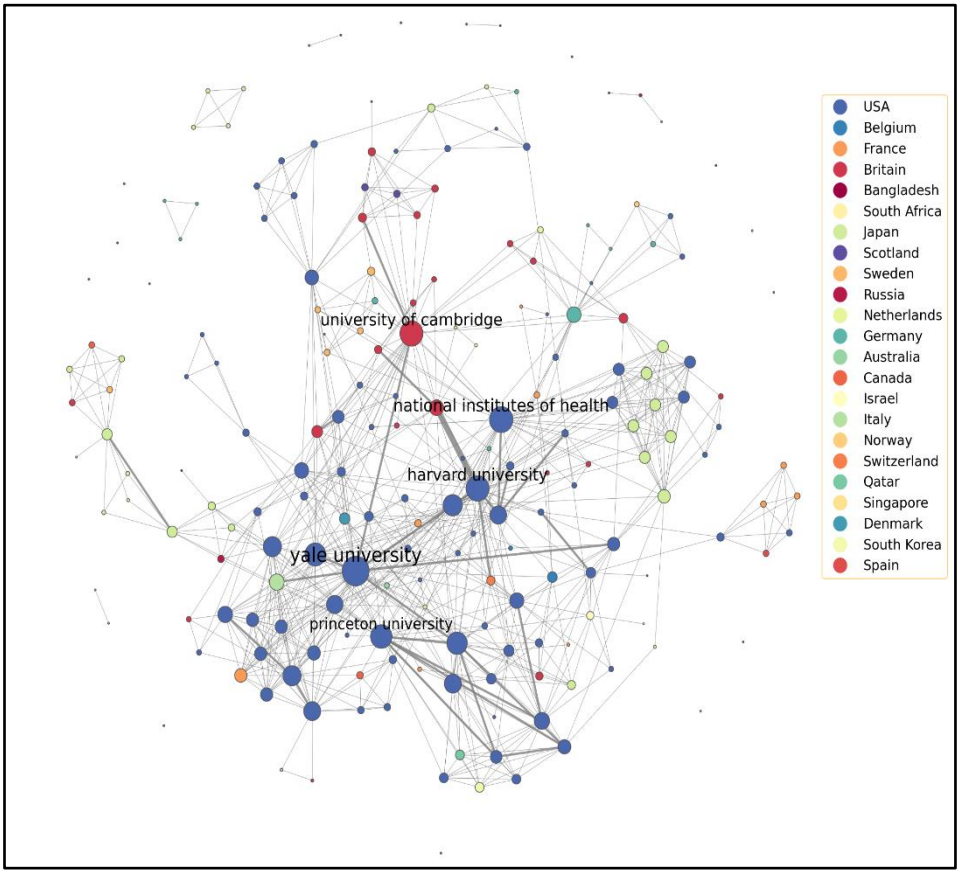
Network a11: Weighted Laureate Projection - after 2000



We see a less intertwined laureate projection than in Network a8 from *1970-1999*, with a clear Japanese clique forming at the bottom of the network. Clearly, there is still a majority of central US laureates in the network, but we see a more nuanced network structure with regard to nationality. We see that the main network component is roughly split down the middle with US laureates on the left, and British laureates on the right. We also notice that there once again appears Russian nodes in the network, who are completely isolated from the main network component.

We plot the organization projection for the period *after 2000* in Network a12.

Network a12: Weighted Organization Projection - after 2000



The US organizations are still prevalent and centrally positioned in Network a12, as was also the case in *1940-1969* and *1970-1999*. However, we see that the British university, Cambridge, is also one of the most central nodes in the network. Furthermore, we notice quite a few Japanese organizations spread throughout the network. We see a smaller cluster of Japanese organizations on the right side of the network, as well as one on the left. This is interesting, as the Japanese organizations have been isolated fringe organizations throughout all of the previous periods.