From: Phillip Weiss
Sent: Saturday, October 30, 2010 12:23 PM
To: Laurence Kirby
Cc: pwnycny@aol.com
Subject: RE: Math 2160 - The Kn graph - strategic considerations

Dear Prof. Kirby,

Thank you for your feedback.

Hypothesis: If a certain enemy, "The Enemy," forms a K7 network around a target, that target will have a tough time defending itself and defeating The Enemy.

Attached are two graphs, Graph 3 and Graph 4.

Graph 3 is a K7 graph encircling an isolated vertex. Graph 4 contains two subsets: a K5 graph and a tree.

Vertex A: The United States (or any country)

Vertices {B-H}: various locations around the planet.

Edges: lines of communication

A K7 set of circuits (Graph 3) will contain 720 possible paths from which The Enemy could attack A, and even if A manages to neutralize one or even two vertices on the K7 network (Graph 4) and reduce it to a K6 or K5 network, that would still leave The Enemy with a lot of room for maneuvering. Eliminating vertices on paper is easy. But if A is the United States, and the K7 network extends around the world, then the elimination of even one vertex, let alone two, would pose a daunting military challenge, one that would most likely require an expenditure of resources so immense as to render such a response problematic. Remember, I am referring to a K7 network that spans the entire planet. Moreover, even if the U. S. manages to reduce the number of Hamiltonian circuits available to the enemy, it would still be vulnerable to attack, especially at vertices B and C (Graph 4). In addition, with sufficient resources and determination, The Enemy could theoretically expand its network by looping around B and C (re: the broken edge in Graph 4 connecting H and D), and create a semi-Eulorized path which could then be quickly converted into a Eulorized network, from which position The Enemy could attack and retake vertices B and C, forcing the U. S. to retreat back to vertex A, again isolated inside a restored K7 graph.

While in control of vertices B and C the U. S. could conceivably consolidate

and strengthen its strategic position by creating its own circuit, {A,B,C} each vertex connected by two lines, but again, this would probably require an immense expenditure of resources.

This entire scenario is hypothetical but given the current international climate and the advances being made in the fields of communications and weapon technology, anything is possible.

Phillip Weiss

-----Original Message-----
From: Phillip Weiss
Sent: Wed 10/27/2010 11:38 AM
To: Laurence Kirby
Subject: Math 2160 - The Kn graph - strategic considerations

"The art of war is simple enough. Find out where your enemy is. Get at him as soon as you can. Strike him as hard as you can, and keep moving on. "

Ulysses S. Grant

A Kn graph contains (n-1)! Hamiltonian circuits. For example, a K7 graph contains 6! or 6 x 5 x 4 x 3 x 2 x 1 or 720 Hamiltonian circuits meaning that a mobile enemy force with access to those circuits would have 720 possible routes from which to attack a target isolated inside the circuit. Against a mobile enemy, an effective defense is virtually impossible. Examples: Yorktown, 1781. Vicksburg, 1863. France, 1940. Singapore, 1942. Bataan, 1942. Stalingrad, 1943. Koenigsberg, 1945. Berlin, 1945. In each battle cited, a formidable military force was surrounded, isolated and decisively defeated by an enemy with superior mobility.

Prior to the official start of World War Two, Japan was already surrounded by a coalition of nations (U.S., U.K., Netherlands, China) which had formed a circuit around Japan. The Japanese knew that their strategic position would be untenable unless they could break the circuit. In 1937 they attempted to break the circuit by invading China. They failed. In December 1941 they again attempted to break the circuit by launching a huge surprise offensive against the U.S., U.K. and the Netherlands. Again they failed. Both times the circuit held and by 1943 Japan was on the defensive, effectively isolated. When the Soviet Union declared war on Japan in August 1945 the circuit was reinforced; another vertex added. Japan's situation was hopeless. Within days Japan surrendered, the country completely blockaded.

From a strategic vantage point, the superiority of the K-n graph over a tree graph is apparent. On a tree graph, eliminate a vertex and an entire section of that tree disappears; the remaining tree is reduced in size. However, on a Kn graph, especially one with numerous vertices, eliminate a vertex and the graph still remains viable, albeit with fewer circuits. Operation Barbarrosa (June 1941) is an example of the failure of an offensive strategy based on the tree graph model. Vertices were exposed; movement was one-directional; pathways were vulnerable; alternate pathways non-existent. As the Germans advanced their Soviet opponent withdrew, regrouped and recovered and before long the Soviets were building their own circuit, dictating the direction of battle, and by April 1945 encircled Berlin itself. Indeed the entire Eastern Front became part of one massive circle of forces which by April 1945 split Germany in half.

Hitler tried to build his own circuit too. Operation Barbarossa was part of a larger strategic plan to create a circuit so strong as to make Germany impervious to attack and thereby win the war. The key to success for his plan was to invade and occupy the mideast and gain control of most of the world's oil supply. Once in control of the oil, Hitler could dictate peace terms. With a huge military force occupying almost all of Europe, with fleets of U-boats controlling the oceans, with access to the almost unlimited wealth of an entire continent, with the Soviet Union in disarray, with the technological capability to develop new and even more lethal weapons, including jet aircraft, ballistic missles and possibly even atomic weapons, and with access to and control of much of the world's oil reserves, Hitler may have succeeded in achieving his strategic goals.

Today the whole world is a battlefield. 9/11/01 is ample proof of that. Conventional warfare has been trumped by new forms of conflict involving forces whose tactics are transnational, extragovernmental, outside conventional norms, and characterized by mobility and stealth, conditions ideally suited for warfare in accordance with the Kn graph model.

"Hence that general is skilful in attack whose opponent does not know what to defend; and he is skilful in defense whose opponent does not know what to attack."

"Invincibility lies in the defence; the possibility of victory in the attack."

Sun Tzu

In war ...

Phil's Postulate 7: All else being equal, mobility trumps size.

Phil's Postulate 8: Form a circuit, win the battle.

Phil's Postulate 9: Break the circuit, deny mobility.

Phil's Postulate 10: A K-4 graph is superior to K-3, K-5 is superior to K-4, etc.

Phil's Postulate 11: An isolated vertex is tantamount to defeat.

Phil's Postulate 12: The more complex the tree, the more vulnerable are its branches.

Phillip Weiss