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THE STABILITY OF DETERRENCE

by

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Introduction

Much is being written about the strategic balance, and about deterrence. Reference is frequently made to the "stability of the balance" or to some development as being "destabilizing". The concept of stability is a very important one, and it is desirable that it be understood and used precisely. The purpose of this short paper is to discuss "stability", to trace its significance in the physical sciences, and to describe its applicability to the analysis of strategic systems.

Stability in the Physical Sciences

In chemistry, a compound is said to be stable if it is difficult to decompose. Explosives offer a useful example: it is very important that they be stable during manufacture, storage, and transportation, tolerating physical shocks or changes in temperature without exploding. But when the time comes to make them explode, the shock and heat of the detonating mechanism must initiate a violent decomposition.

Mental patients are described as "unstable" when an ordinary stress of the type borne everyday by normal people is sufficient to drive them to abnormal actions.

With the precision typical of physics, mechanics gives stability a mathematical definition. Static equilibrium can be stable or unstable, depending on whether a small displacement from the position of equilibrium will be returned to the original position or will grow to a larger permanent displacement. Similarly, a moving body can be in stable dynamic equilibrium if it reacts to a small impulse by returning to the initial motion. One of the main objectives of control theory

.../2

is to design systems to be stable, meaning that they will counteract perturbations in such a manner as to return the system to its original state (which could be static position or dynamic motion).

To offer examples, a weighing instrument described as a "balance" is designed to establish a stable equilibrium between an object of unknown weight and a series of standard weights moved along lever arms. When the weights are placed so as to achieve near or exact equilibrium, the device oscillates about the "point of balance", in stable equilibrium.

A floating body is in stable equilibrium for vertical displacement, since if it is given a brief push downwards it bobs up again, and in neutral equilibrium for horizontal displacement, since if it is pushed sideways it neither returns nor accelerates sideways after the pushing force is removed. But in the case of a ship, the type of equilibrium for rotation is very important. A properly designed ship will roll when struck by a wave or a gust of wind on the beam, but the natural forces of buoyancy will return it to the vertical. However, if ice should begin to form on the superstructure, the centre of gravity will begin to rise, and if it gets above a particular point called the "metacentre" the ship will no longer right itself but will roll right over. Before the ice forms, the ship is stable. The formation of the first ice could be called "destabilizing" inasmuch as it is a process which will render the ship unstable if carried beyond a certain point. But until this happens, the ship is still stable (although less stable) against rolling. It is possible to accept a certain amount of destabilizing influence before the equilibrium has been rendered unstable.

.../3

In the case of the rolling ship, the gust of wind or the wave is not destabilizing. Stability is a condition of the ship. A shift of cargo could be destabilizing. Stability is associated not with the applied stress, but with the nature of the reaction to it.

A well-designed model aircraft in flight corrects for small perturbations in roll or pitch. A well-designed real aircraft can be flown without continuous "hands-on" control by the pilot. It is "inherently stable" in flight. If an auto-pilot is fitted, it will make corrective changes to maintain straight and level flight, conferring dynamic stability.

Stability of Deterrence

To move to the problems of strategic competition, a state of mutual deterrence represents a form of equilibrium, and can be either stable or unstable. However, the analogy with mechanics is far from exact. Deterrence can be unilateral instead of mutual. And there are several types of stability that can be associated with deterrence. Of these, the two most important are crisis stability and arms control stability.

Crisis Stability

Crisis stability bears some resemblance to chemical stability. A stable system can accept a certain amount of stress without exploding violently.

An example of a crisis-unstable strategic system would be one whose retaliatory weapons were vulnerable to a counterforce first strike. If information is received (whether true or false) that an attack is likely (imminent, or has already begun), then there is a strong motive to "fire on warning", i.e., to use the retaliatory weapons immediately, before they are

destroyed. Thus a large reaction is likely to a small, perhaps imaginary or accidental stress. Conversely, a retaliatory system that is invulnerable, and can survive a counterforce attack and reply at a later time if desired, is crisis-stable.

Should one side (A) believe that it has nearly enough weapons to be able effectively to disarm its opponent (B) in a counterforce first strike, and then receives intelligence that a proportion of B's retaliatory weapons will be unserviceable for a short period, then A has a rational motive to strike first and soon. This would be a crisis-unstable situation, in contrast to one in which B possessed retaliatory weapons in numbers sufficient to allow considerable unserviceabilities before the numbers still operable fell below the level needed to be able to deliver unbearable retaliation against A's population.

Crisis instability is associated with one side having a rational motive to initiate hostilities, or to escalate them quickly. Conversion to a more crisis-stable situation could require changes in the number of weapons (possibly upwards rather than downwards), changes in certain characteristics (such as vulnerability), or establishment of better information systems (possibly surveillance, possibly facilities for communication between adversaries in time of crisis).

Arms Control Stability

Arms control stability is concerned with time scales longer than those of a crisis, long enough to allow new weapons systems to be ordered and deployed. In a situation unstable in this respect one or both sides would have rational motives to order procurement of new weapon systems so as to preserve deterrence or its crisis stability in the future.

.../5

For example, if A is known to be procuring a large number of very accurate MIRVs, which will enable him to deliver a disarming counterforce first strike against B's fixed ICBM sites, B will feel the need to preserve his future capability for deterrence by carrying out one or more measures such as:

- hardening his ICBM sites
- building more ICBM sites (or other retaliatory weapons)
- making some of his missiles mobile
- defending his ICBM sites

Conversely, if A's expected new warheads were known to be comparatively inaccurate, with small yield, but equipped with good penetration aids, and were not associated with an increased number of launchers, they would be considered as a second-strike counter-value retaliatory force and should not require any countermeasure by B. The first development would be destabilizing, but not the second, from the point of view of armament programs.

As another example, suppose that A is building Ballistic Missile Defence around his major cities. B might feel the need to equip his ICBMs and SLBMs with improved penetration aids, in order to maintain his deterrent capability for retaliation. Conversely, if A put his new BMD around ICBM sites only, B should not feel that his capability to retaliate against A's cities has been reduced. The first, but not the second development would tend to destabilize the state of deterrence as regards arms buildup.

Conventional Deterrence

Conventional deterrence lacks the overwhelming sanction of nuclear devastation of cities. The lesser punishment is defeat on the battlefield, possibily followed by loss of territory. However, the concept of crisis stability can be applied,

.../6

related to rational incentives to initiate hostilities.

If the state of military capabilities favours defence over offence, this will have a stabilizing influence. Of course, sufficient preponderance of force could overcome any defence. Trench warfare, dominated by barbed wire and machine guns, favoured the defence and was stabilizing, although what it stablized between 1915 and 1918 was a dreadful war of mutual attrition. Blitzkrieg allowed the offence to triumph, and was destabilizing.

If some new weapon were clearly useful for defence rather than offence, its introduction would be stabilizing. However, very few weapons can be described as purely defensive or purely offensive. And, since it is often said that offence is the best defence, there is little prospect of separating the weapons for one from the other. There may be a few systems such as harbour defences or permanent fortifications, that are clearly defensive in nature and consequently stabilizing. However, many of them will make use of weapons such as heavy artillery, mines, and chemical decontamination that are also associated in other contexts with offensive operations.

There is one feature of modern military technology that makes the world situation less stable from the point of view of arms control than in earlier times. This is the increasingly long period of time needed for great nations to rearm for defence. It is becoming more and more likely that wars will be decided by those forces in being on M-Day. An unprepared nation attacked by an opponent who has completed his rearmament may not be given the time needed to bring his potential strength to bear for his own defence. Thus, there is a rational incentive to convert economic potential into actual armaments against a threat

.../7

perceived likely in the future.

Apart from rearmament, which would take many months, another step in preparing for war (whether offensive or defensive) is mobilization. Although this can be completed in a week or two, there will be great concern not to let the opponent complete his mobilization first. Thus, dependence on mobilization is crisis-destabilizing inasmuch as there is a rational incentive to do it first in a confrontation. Moreover, mobilization is likely to be seen as a provocative act by the opponents. The long time to rearm affects the stability of arms control, the importance of mobilization is a factor in crisis instability.

Intelligence and Communication

A is only able to deter B through B's belief in the effectiveness of A's weapons. Consequently, supposing that A's weapons really are effective, it is in A's interests that B's intelligence confirm this fact. Moreover, should A wish to deter B with a particular threat during a crisis, he must be able to communicate the threat to B's leadership. Deterrence itself depends on good intelligence and communication.

Poor intelligence and communications are likely to contribute to instability in a crisis, largely because unverifiable rumours of enemy activity may be alarming and provide cause for counteraction. The ability to communicate directly with the opponent (as by the "Hot Line" between Washington and Moscow) could be stabilizing in a crisis.

For an arms control agreement to result in a stable balance of power it is essential that both parties feel confident that its terms are being observed. Such verification is likely to depend on good intelligence, and the resolution of misunderstandings on good communications.