Central Intelligence Agency

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Reference: F-2015-02095

This is a final response to your 1 July 2015 Freedom of Information Act (FOIA) request for **"a copy of the following six CIA documents:**

1. **FDD-6440, World Press Treatment of the Use of Gas in Vietnam (translation), May 6, 1965.**
2. **Potential Implications of Trends in World Population, Food Production and Climate, August 1974.**
3. **A Study of Climatological Research as it Pertains to Intelligence Problems, August 1974.**
4. **China: The Coal Industry, November 1976.**
5. **Deception Maxims: Fact and Folklore, April 1980, XD-OSD/NA.**
6. **The Biological and Chemical Warfare Threat, January 1997."**

We processed your request in accordance with the FOIA, 5 U.S.C. § 552, as amended, and the CIA Information Act, 50 U.S.C. § 3141, as amended. Our processing included a search for records as described in our 22 July 2015 acceptance letter.

We completed a thorough search for records responsive to your request and located the enclosed three documents, consisting of 114 pages, which we determined are releasable to you in their entirety. Because you are entitled to the first 100 pages free, and the cost for the remaining pages is minimal, in accordance with our regulations, as a matter of administrative discretion, there is no charge for processing your request.

Sincerely,

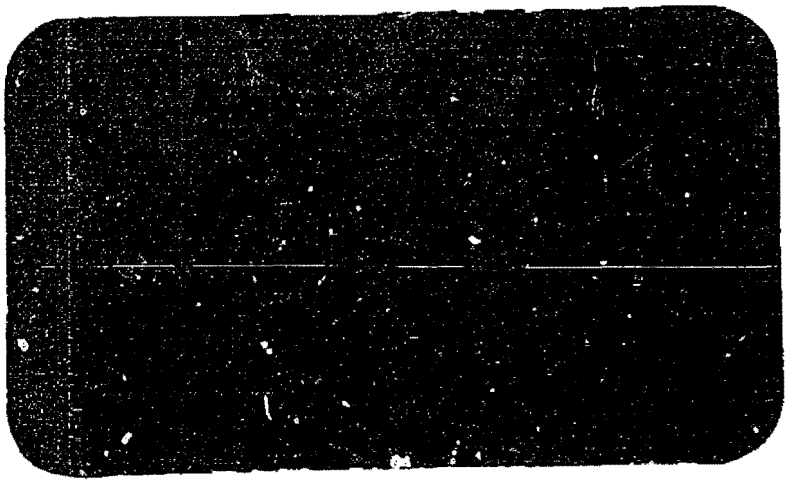
Michael Lavergne

Michael Lavergne
Information and Privacy Coordinator

Enclosures

C00036554

55 pages



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DECEPTION RESEARCH PROGRAM

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June 1981

"DECEPTION MAXIMS: FACT AND FOLKLORE"

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The Dancing Faun, the logo on the cover, is the Greco-Roman figure emblematic of the work of the London Controlling Section, the secret organization founded by Churchill to plan the stratagems that would leave Hitler puzzled as well as beaten.

DECEPTION MAXIMS: FACT AND FOLKLORE

ABSTRACT

The deceptions maxims discussed in this report represent the synthesis of a number of historical case studies. These case studies are part of an ORD exploratory research program on deception. It is anticipated that these maxims and other results from this research will aid intelligence analysts in thinking about the problem of deception and in detecting, analyzing and evaluating foreign deception schemes relevant to current intelligence problems.

Deception Research Program
June 1981

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Introduction

The past several years have witnessed a substantial growth of interest in the role and efficacy of deception and surprise in military and political affairs. This growth has been reflected in an increased number of scholarly analyses on the subject[1] and spurred by the release of some of the most closely held secrets of World War II.[2] As well, political scientists, sociologists, intelligence analysts, and others have explored and codified theory and hypotheses relevant to misperception, failures and cognitive biases in intelligence analyses, and other related topics.[3] It seems appropriate to explore, integrate, and summarize this work into a unified body of knowledge. To help catalyze this synthesis, several hypotheses or maxims relevant to deception and surprise are offered herein. These maxims have been distilled from historical accounts, summarized from analytical expositions, and extracted from conversations with some of the leading deception planners of World War II vintage. They are ventured as hypotheses for further testing and analysis, much in the spirit of Jervis' useful "Hypotheses on Misperception" (14) a work which influenced both format and content of this paper. The wisdom of some of these

maxims, however, can be supported from historical evidence. Others emerge from relevant social science theory, decision analysis, and/or game theory. Finally, some are suggested by anecdotal material and, though plausible, are untested and of unknown generality.

An Aside: Remarks on the Data Base

Elsewhere in this paper, reference will be made to analyses based upon an historical data base. This data base was prepared by Dr. Barton Whaley, then of M.I.T., as part of an ongoing research effort on deception. From Alam el Halfa to Yugoslavia, the data base currently consists of over fifty quantitative and qualitative attributes of 232 military engagements over the period 1914 to 1973. Data elements include categorical attributes (e.g., was deception employed, was surprise achieved, did the attack plan reflect the opponent's preconceptions, etc.) as well as quantitative variables (e.g., strengths, casualties, etc.). For many entries in this data base, there is general agreement among the various source materials consulted. For some, however, the data were more ambiguous or even contradictory. Finally, there are cases for which some data are missing entirely and reasonable estimates

inserted and/or indirect evidence used as a surrogate. Despite these difficulties, the evidence for many of the conclusions drawn in this paper is sufficiently strong that the analysis is robust to even substantial errors of omission/commission. Both strategic and tactical level engagements on land, sea, and air are included.

In analyzing a subset of these data in his manuscript, Stratagem, Dr. Whaley presented numerous cross-tabulations, sorts, counts, trends, etc. as raw or summarized data but omitted various statistical tests of hypothesis. This omission was deliberate, reflecting two considerations:

> First, the major battles constituted nearly an exhaustive sample.[4] If the population is viewed as finite, i.e., only those battles that actually took place in this time period, then statistical tests are unnecessary as the variances of all estimates are essentially zero. This was the assumption in Whaley's original analysis. However, if the battles themselves are regarded as a sample from a larger population - i.e., battle situations that might have occurred, then statistical methods are appropriate and, indeed, are necessary.

> Second, the tactical engagements contained in the data base constitute what is termed a convenience sample rather than a random sample (inter alia a function of data availability) and may not be fully representative. Thus, statistical tests of hypotheses could be misleading -- but then so too would be counts, cross-tabulations, etc.

Thus, the view taken in this paper is that statistical tests are appropriate provided the results are interpreted with due caution considering the inherent data limitations. The analyses here should be termed exploratory rather than adjudicatory. Absent the selection and analysis of a truly random sample, an activity perhaps impossible in principle, this data base is sui generis, one of a kind. It would be imprudent to fail to consider such conclusions as may follow from analysis of these data.

The Deception Maxims

The following section contains ten principles or maxims that are relevant to deception. No claim is offered that this is a minimal, sufficient set, that these principles are entirely self-consistent or that

they are all at the same level of generality. In formulating these, several balances had to be struck -- balances between generality and usefulness, level of abstraction and interest, breadth versus detail and the like. Doubtless other observers or analysts would phrase these somewhat differently and/or shift the balance of emphasis among them. Nonetheless, it is felt that these serve as a useful first approximation to build theory upon.

Maxim 1: Magruder's Principle--the Exploitation of Preconceptions

- It is generally easier to induce an opponent to maintain a preexisting belief than to present notional evidence to change that belief. Thus, it may be more fruitful to examine how an opponent's existing beliefs can be turned to advantage than to attempt to alter these views.

Perhaps the most striking application of this principle in military deception is to be found in the selection of the invasion site and cover plan for the D-Day invasion at Normandy. It is well established that Hitler and most (but not all) of his senior military

advisors believed that the most likely place for the Allied invasion of Europe would be in the Pas de Calais region (see, for example, Ellis (16)). Moreover, the Allies were aware of this belief. According to Cave Brown (17), "they knew--from Ultra, and particularly from the intercepts of Baron Oshima's [the Japanese ambassador at Berlin] traffic--what Hitler expected the Allies to do. He expected them to land at the Pas de Calais which he considered the logical point of attack." Indeed, so strong was this preconception, that for several days after the invasion at Normandy (see, Speer (18)):

> "...Hitler remained convinced that the invasion was merely a feint whose purpose was to trick him into deploying his defensive forces wrongly....The Navy, too, considered the terrain unfavorable for large-scale landings, he declared. For the time being he expected the decisive assault to take place in the vicinity of Calais--as though he were determined that the enemy, too, would prove him to have been right. For there, around Calais, he had ever since 1942 been emplacing the heaviest model guns under many feet of concrete to destroy an enemy landing fleet." (Emphasis added)

This preconception formed the basis for an elaborate deception plan keyed to reinforcement of this belief. If, according to Jervis (hypothesis No. 1

(19)), "actors tend to perceive what they expect," then these expectations furnish greater leverage to a deception plan--a form of mental jujitsu. Such a maxim, termed Magruder's Principle[5] by Lewin, appears to be well appreciated by deception planners, and is consistent with numerous studies on the psychology of perception. David Mure (23), for example, recalled that one of Brigadier Dudley Clarke's inflexible rules for development of cover plans was that "all cover plans should be based on what the enemy himself not only believes but hopes for." Clarke was one of the leading deception architects for the British in North Africa and the Middle East and, according to some, the best deception planner in WWII (63).

There is ample historical evidence to confirm the efficacy of Magruder's Principle. Figure 1 contains entries from the historical data base described previously. These entries (including both strategic and tactical cases) are categorized according to whether or not deception was employed, whether or not plans were keyed to enemy preconceptions and whether or not surprise was achieved. Analyses of these data, shown also on Figure 1, enable two conclusions to be drawn. First, historically, deception schemes have more often

FIGURE 1: RELATIONSHIP BETWEEN DECEPTION, PRECONCEPTION, AND SURPRISE

A. RAW DATA

WAS DECEPTION EMPLOYED?	WERE PLANS KEYED TO ENEMY PRE-CONCEPTIONS?	WAS SURPRISE ACHIEVED? YES	NO	UNKNOWN	TOTALS OR SUBTOTALS
Yes	Yes	106	4	0	110
	No	17	4	0	21
	Unknown	8	1	0	9
No	Yes	0	0	0	0
	No	5	1	0	6
	Unknown	12	58	0	70
Unknown	Yes	0	0	1	1
	No	0	0	1	1
	Unknown	0	0	6	6
Totals or Subtotals		156	68	8	232

B. AND SOME CONCLUSIONS

Historically, deception schemes have more often been keyed to enemy preconceptions...

...and when deception is keyed to enemy preconceptions the probability of surprise is greater.

Supporting Data:

Cases where deception is known to have been employed

	KEYED TO ENEMY PRECONCEPTIONS? Yes	No	TOTAL
COUNTS	110	21	131
%	84	16	100

Relevant Statistic:

	OBSERVED COUNT	EXPECTED COUNT UNDER NULL HYPOTHESIS
Yes	110	65.5
No	21	65.5
Total	131	131.0

Computed Value of Statistic

$$\chi^2 = \frac{(110-65.5-.5)^2}{65.5} + \frac{(21-65.5-.5)^2}{65.5} = 60.47$$

Critical Value of Statistic

$$\chi^2_1(.05) = 3.84$$

Supporting Data:

Cases where deception is known to have been employed

WAS DECEPTION KEYED TO PRECONCEPTION?		WAS SURPRISE ACHIEVED Yes	No	SUBTOTAL
	Yes	106	4	110
	No	17	4	21
SUBTOTAL		123	8	131

Relevant Statistic:

Computed Value of Statistic

$$\chi^2 = \frac{\{|(106)(4)-(17)(4)|-\frac{131}{2}\}^2 131}{(110)(123)(21)(8)} = 4.86$$

Critical Value of Statistic

$$\chi^2_1(.05) = 3.84$$

than not been keyed to enemy preconceptions--according to the data in 110 out of 131 (or 84 percent) of the cases. This supports the assertion that deception planners subscribe to the principle. Second, these data support the conclusion that when deception is keyed to enemy preconceptions, the probability of surprise is greater. Though the overall degree of success (measured by the fraction of cases resulting in surprise) using deception is large, 123 out of 131 (or 94 percent) of the cases, a more disaggregated analysis is possible. Specifically, when deception was keyed to existing belief, surprise resulted in 106 out of 110 (or 96 percent) of the battles, whereas, when this was not the case, surprise resulted in "only" 17 out of 21 (or 81 percent) of the battles--a statistically significant difference (but recall earlier disclaimers) if this were a random sample. A puzzling aspect of the raw data concerns those situations where deception was not employed and plans were consistent with preconceptions. It would be expected that this would have a low incidence of surprise, yet all eight cases (beware of small sample sizes) resulted in surprise--weak support for what some observers have termed, "the inevitability of surprise." The next principle suggests some reasons that help explain the prevalence of surprise.

Maxim 2: Limitations to Human Information Processing

- There are several limitations to human information processing that are exploitable in the design of deception schemes--among these, the law of small numbers and susceptability to conditioning.

Many barriers or limits to human information processing and decision making have been explored in the literature (see, Kirk (15) and Slovic (24) for useful surveys). Though a confusing, sometimes ambiguous and overlapping welter of names for various defects/characteristics of information processing (e.g., bounded rationality, perceptual readiness, premature closure, "groupthink," evoked set, "anchor and adjustment," and attribution theory to cite only a few examples) may serve to complicate a clear understanding of the matter, it is possible to extract several concepts which may explain an almost universal vulnerability to deception. First intuitive probabilistic judgments often show substantial biases. Equally, subjective standards for analyzing the adequacy of evidence are poor and sometimes ill-defined.

"The law of small numbers" is the name given by Tversky and Kahneman (25) to describe one pathology in

intuitive inference. Originally adduced from an analysis of the deficiencies in research design of the experiments of psychologists which showed that these scientists had "seriously incorrect notions about the amount of error and unreliability inherent in small samples of data" (24), this cognitive bias appears to be quite widespread.

It is not difficult to find instances of the same phenomenon in political/military decison making. Figure 2 provides three interesting examples, the lack of alertness of German troops on the eve of the Normandy invasion, Stalin's belief that the Germans would issue an ultimatum prior to any invasion of Russia, and the view expressed by some analysts that Krushchev would not place offensive missiles in Cuba. In each example a critical inference was drawn on the basis of a very small sample size. Later in this discussion, the results of Axelrod will be summarized which call to question whether any inference can be drawn from the data in these examples. It is sufficient in this context to note the imprecision of binomial estimates from small sample sizes.[6]

Another limitation of human information processing relevant to deception planning is the frequent inability

FIGURE 2: THE 'LORE' OF SMALL NUMBERS: SOME EVIDENCE IN THE POLITICAL MILITARY DIMENSION
(Emphasis added.)

TIME PERIOD	EVENT	QUOTE	CITATION	REMARKS
WORLD WAR II	D-Day, the Invasion at Normandy, 1944	All along the chain of German command the continuing bad weather acted like a tranquillizer. The various headquarters were quite confident that there would be no attack in the immediate future. Their reasoning was based on carefully assessed weather evaluations that had been made of the Allied landings in North Africa, Italy, and Sicily. In each case conditions had varied, but meteorologists like Stobbe and his chief in Berlin, Dr. Karl Sonntag, had noted that the Allies had never attempted a landing unless the prospects of favorable weather were almost certain, particularly for covering air operations. To the methodical German mind there was no deviation from this rule; the weather had to be just right or the Allies wouldn't attack. And the weather wasn't just right.	Ryan, C., The Longest Day, Simon and Schuster, New York, 1959, pp.79-80. See also Stagg, J.M., Forecast For Overlord, (New York: W.W. Norton, 1971), pp.61,135.	Though extensive deception operations were employed at Normandy, the timing of the invasion was not included in these plans. To be sure, the Germans did not have access to the data upon which the Allied weather forecast was based (partially as a result of allied attacks on weather reporting stations) and thus did not have foreknowledge of the possible break at D-Day.
	Operation Barbarossa, the German Invasion of Russia, 1941	One example of an assumption of strategic possibility is reflected in Stalin's belief that Hitler must issue an ultimatum before war would break out. The fact that prior to April 9, 1941, Germany had made ultimate demands before undertaking military action, convinced Stalin that this pattern would continue in the future.	Ben-Zvi, A. "Hindsight and Foresight: A Conceptual Framework for the Analysis of Surprise Attacks," World Politics Vol. 28, No. 3, April 1976, p. 384.	The sample size upon which this was based was less than five.
CUBA 1962	The Missile Crisis	...(a failure of intelligence evaluation) was the predisposition of the intelligence community to the philosophical conviction that it would be incompatible with Soviet policy to introduce strategic missiles into Cuba. Khrushchev had never put medium- or long-range missiles in any satellite country and therefore, it was reasoned, he certainly would not put them on an island 9,000 miles away from the Soviet Union, and only 90 miles away from the United States, when this was bound to provoke a sharp American reaction.	Wohlstetter, Roberta, "Cuba and Pearl Harbor: Hindsight and Foresight," Foreign Affairs, Vol. 43, July 1965, p. 701.	The sample size upon which this was based was less than five.

of actors to detect small changes in observables, even if the cumulative change over time is large. This is the counterpart to Jervis' Hypothesis #3 (26), "actors can more easily assimilate into their established image of another actor information contradicting that image if the information is transmitted and considered bit by bit than if it comes all at once." This is the basis for the use of conditioning as a deception technique.

Conditioning or gradual acclimatization has an important place in the design of deception schemes. There are numerous instances of its succcessful application. One now-classic application of this principle was made in the breakout of the German ships SCHARNHORST, GNEISENAU and PRINZ EUGEN from Brest on 12 February 1942. The breakout was facilitated by jamming the British radar. Ordinarily this would have been a significant tip-off that something was amiss, but the British radar operators dismissed it as caused by atmospheric disturbance. This error was the result of a carefully orchestrated German ruse directed by General Wolfgang Martini, the Head of the Luftwaffe Signals Service. As Potter (27) observed:

> "At dawn each day during January English radio stations had a few minutes of jamming, deliberately

> made to appear like atmospherics. Every day the length of the jamming increased slightly. By February British radar operators were wearily accustomed to this interference. They reported it as caused by atmospheric conditions."

Nor did the Germans have any monopoly on the concept. It was frequently employed by the RAF for feints or diversionary operations. One significant example was in the British attack on Peenemunde on 17 August 1943. As Irving (28) recounted:

> "The...series of minor attacks on Berlin demonstrated the thought and preparation which had gone into the attack on Peenemunde. Sir Arthur Harris had been dispatching seven or eight Mosquitoes almost every night to attack Berlin...each night the Mosquitoes followed the same northerly track into Berlin; each night the sirens at Peenemunde howled; and each night the hundreds of scientists and engineers clambered frenziedly into their shelters. This was what bomber command intended."

This ruse was singularly successful. At the cost of one aircraft lost to a German fighter, the eight Mosquito bombers used in the diversion lured 203 enemy fighters to Berlin. Of 597 British bombers dispatched to Peenemunde, 40 (6.7%) were lost and 32 damaged and all but 26 managed to attack the target. Except for faulty timing by the last bomber wave, few would have been lost over the target itself, a saving of almost

half. And, except for the British ruse, it is quite possible, as one German post-mortem claimed, that an additional 160 bombers would have been shot down (29, 30).

A final remark relative to the frailties of human information processing; a reading of the literature suggests the hypothesis that 'actors tend to dismiss unlikely events as impossible events.' Such a concept favors bold and imaginative strategies such as Hannibal crossing the Alps or the landing at Inchon. A similar thought prompted Handel's second paradox relevant to self-deception (31):

> "Paradox #2: The greater the risk, the less likely it seems, and the less risky it actually becomes. Thus, the greater the risk, the smaller it becomes."

Maxim 3: The Multiple Forms of Surprise

- Surprise can be achieved in many forms. In military engagements, these forms include location, strength, intention, style, and timing. Should it not prove attractive or feasible to achieve surprise in all dimensions, it may still be possible to

> achieve surprise in at least one of these. Thus, for example, if intentions cannot be concealed, it may still be possible to conceal timing (cry-wolf syndrome), place, strength or style.

This assertion is for the most part self-evident. An interesting aspect of the closing sentence which relates to the phenomenon of conditioning is the debilitating effect of the "cry-wolf" syndrome. Figure 3 provides several quotes that illustrate the desensitizing effect of false alerts; at Pearl Harbor, Darwin, Korea, Vietnam, and Israel 1973. The parallelism of the quotations is striking.

There can be no doubt that "cry-wolf" is an established element in the folklore of indications and warning. Equally, there should be no doubt that such concern is justified by historical evidence. Figure 4 shows various cross tabluations and a statistical analysis of the historical data involving deception, false alerts, and resulting surprise. In particular, the data show that when one or more false alerts preceded the military engagement described in the case (the definition of "cry-wolf" in the table), surprise resulted in 92 percent of the cases. Where this was not

FIGURE 3: DESENSITIZATION BY FALSE ALERTS--SOME HISTORICAL QUOTES AND A TONGUE-IN-CHEEK DECISION RULE FOR THEIR ELIMINATION

DESENSITIZATION BY FALSE ALERTS

TIME PERIOD	EVENT	QUOTE	CITATION	REMARKS
WORLD WAR II	Pearl Harbor	First, there is the "cry wolf" phenomenon. Admiral Stark actually used this phrase in deciding not to send Admiral Kimmel any further warnings about the Japanese. An excess of warnings which turn out to be false alarms always induces a kind of fatigue, a lessening of sensitivity. Admiral Kimmel and his staff were tired of checking out Japanese submarine reports in the vicinity of Pearl Harbor. In the week preceding the attack they had checked out seven, all of which were false.	Wohlstetter, Roberta, "Cuba and Pearl Harbor: Hindsight and Foresight," Foreign Affairs, Vol. 43, July 1965, p. 699.	There was an extensive cover and deception plan associated with the Pearl Harbor attack. As far as can be determined, however, deliberate desensitization was not included as an element.
	"Australia's Pearl Harbor" The Attack on Darwin	I was confident that [the coastwatcher] must have seen something very unusual. I wanted to sound the alarm at once but was overruled. There had been a series of earlier false alarms which it was undesirable to repeat.	Lockwood, D. Australia's Pearl Harbour: Darwin 1942, Cassell, Melbourne, Australia (1966), p.24	Remarks of Lt. Commander J.C.B. McManus, the senior intelligence officer at Navy Headquarters, Darwin in explaining why warning information which reached him 30 minutes prior to the attack was disregarded. The attack on Darwin occurred on 19 Feb 1942, some ten weeks after Pearl Harbor.
KOREA 1950	Outbreak of Korean War	...intelligence sources had "cried wolf" so often before June 1950 that nothing in the reports at that time "put us on notice that anything was going to happen in Korea.	De Weerd, H.A., "Strategic Surprise in the Korea War," Orbis VI (Fall 1962), p.446.	Testimony of then Secretary of Defense Johnson in explaining intelligence failures. In June 1950 the State Department, the CIA and the Department of the Army all agreed that the possibility existed for a North Korean attack but that "this attack did not appear imminent.
VIETNAM 1968	Opening of the Tet Offensive	Analysts who reflexively warn of disaster are soon decided as hysterical. General William Westmoreland recalled that the warnings that had been issued before the 1968 Tet Offensive were ignored. U.S. Headquarters in Saigon had each year predicted a winter-spring offensive, "and every year it had come off without any dire results...Was not the new offensive to be more of the same?"	Betts, R.K., "Analysis, War & Decision: Why Intelligence Failures are Inevitable" World Politics, Vol 31, No.1 (Oct 1978) p.75	
ISRAEL 1973	Opening of 1973 War	This effect is what Prime Minister Meir had in mind when she said pleintively: 'No one in this country realizes how many times during the past year we received information from the same source that war would break out on this or that day, without war breaking out. I will not say this was good enough. I do say it was fatal.'	As quoted in Shalaim, Avi. "Failures in National Intelligence Estimates: The Case of the Yom Kippur War," World Politics, Vol.28, No.3, April 1976, p.356.	Israel had actually mobilized (unnecessarily ?) in response to an earlier warning. The cost of this mobilization was clear to senior intelligence officers in 1973.

A DECISION RULE FOR ELIMINATION OF FALSE ALERTS...?

	As that ancient retires from the Research Department of the British Foreign Office reputedly said, after serving from 1903-1950 'Year after year the worriers and fretters would come to me with awful predictions of the outbreak of war. I denied it each time. I was only wrong twice.'	Hughes, The Fate of Facts in a World of Men-Foreign Policy and Intelligence-Making (NY: Foreign Policy Association, Headline Series #233, Dec.1976)p.48, as quoted in Betts, R.K., "Analysis, War & Decision: Why Intelligence Failures are Inevitable," World Politics, Vol.31, No.1 (Oct 1978)p.67	

FIGURE 4: DECEPTION, CRY-WOLF SYNDROME AND SURPRISE: EMPIRICAL EVIDENCE IN SUPPORT OF FOLKLORE

A. RAW DATA

WAS WOLF CRIED?	WAS DECEPTION ATTEMPTED?	WAS SURPRISE ACHIEVED? Yes	No	TOTALS OR SUBTOTALS
Yes	Yes	23	0	23
	No	1	2	3
No	Yes	106	9	115
	No	26	57	83
TOTALS OR SUBTOTALS		156	68	224

B. BIVARIATE CONTINGENCY TABLES

WAS DECEPTION ATTEMPTED?	WAS SURPRISE ACHIEVED? Yes	No	TOTALS OR SUBTOTALS
Yes	129 (93%)	9 (7%)	138
No	27 (31%)	59 (69%)	86
TOTALS OR SUBTOTALS	156	68	224

$X^2 = \begin{cases} 96.59 \text{ uncorrected} \\ 93.68 \text{ corrected for continuity} \end{cases}$ $\quad X^2_1(.05) = 3.84$

WAS WOLF CRIED?	WAS SURPRISE ACHIEVED? Yes	No	TOTALS OR SUBTOTALS
Yes	24 (92%)	2 (8%)	26
No	132 (67%)	66 (33%)	198
TOTALS OR SUBTOTALS	156	68	224

$X^2 = \begin{cases} 7.15 \text{ uncorrected} \\ 5.99 \text{ corrected for continuity} \end{cases}$ $\quad X^2_1(.05) = 3.84$

C. PARTITIONS OF X^2

TERM	DEGREES OF FREEDOM	COMPONENTS OF X^2 (Parameters Estimated)	SIGNIFICANCE
First Degree			
Deception	1	0	N/A
Cry Wolf	1	0	N/A
Surprise	1	0	N/A
Interaction			
Deception X Cry Wolf	1	8.968	> 1%
Deception X Surprise	1	96.591	> 1%
Cry Wolf X Surprise	1	7.147	> 1%
Deception X Cry Wolf X Surprise	1	0.153	-
TOTALS	7	112.859	

Method of Computation Reference
Kendall, M.G. and Stuart, A. The Advanced Theory of Statistics, Vol.2, Hafner, New York (1961), p.580 et. seq.

D. CONCLUSIONS

- Deception is strongly associated with surprise. When deception was employed, surprise resulted in 93% of the cases; whereas, when deception was not used, surprise resulted in only about one-third of the cases.
- "Cry-Wolf" is likewise associated with surprise, though differences are less dramatic.
- The data are consistent with, but fall short of proving, the hypothesis that deception and prior desensitization lead to even greater chances of surprise.

the case, surprise resulted in 67 percent of the cases, a difference significant in both practical and statistical terms--and indeed, is comparable, though of somewhat less magnitude than the effect of deception on surprise.

The empirical evidence is also consistent with (though it does not prove in a statistical sense) the hypothesis that the combined effects of false alerts and other deception are greater than either factor taken singly--leading to surprise in 23 out of 23 cases.

In view of this finding, it is an interesting curiosity that deliberate desensitization by false alerts was only rarely an integral part of the deception plan. That is, in almost all those cases involving false alerts and deception, the generation of false alerts was not an explicit part of the plan (though the architects of the plan were sometimes aware of the victim's false alerts). In some cases the cry-wolf effect was a byproduct of the deception effort. Thus, in the Peenemunde raid described earlier, the scientists and engineers at Peenemunde were as much the victims of the conditioning as the German air defenses, as revealed by this extract of Professor Werner von Braun's diary (32); "At that moment the air raid sirens sound...first

of all I go to my room; there's no hurry, this is not the first time, it's only been a warning...a number of men...are standing around, looking up at the sky and cracking jokes." But the purpose of the conditioning was to make credible the spoof raid on Berlin, not to desensitize the occupants of Peenemunde.

Indeed, rather than direct or peripheral effort on the part of the adversary, conditioning may result instead from some operational pattern altered or expanded without sinister motive. In this case, the effect is self-deception through misinterpretation. It should also be noted that efforts to reduce the vulnerability to surprise generally take the form of increasing the sensitivity of the warning system. This can also be expected to increase the number of false alarms, in turn reducing the sensitivity (33). Unhappily, we are faced with the troublesome conclusion that some degree of surprise through self-deception and conditioning may be unescapable.

A tongue in cheek decision rule for avoiding false alerts is provided in Figure 3. In a more academic vein, Axelrod (34) framed a decision theoretic model of the tradeoffs between false positives and false negatives, the analytical core of the issue as stated

above, though the Axelrod analysis did not address explicitly the cry-wolf syndrome.

Maxim 4: Jones' Lemma

- Deception becomes more difficult as the number of channels of information available to the victim increases. However, within limits, the greater the number of controlled channels the greater the likelihood of the deception being believed.

This maxim is christened "Jones' Lemma" because it has been best and oft-articulated by Professor R.V. Jones, one of the key figures in British scientific intelligence during World War II. Jones' remarks (35) further illustrate the idea:

> "The ease of detecting counterfeits is much greater when different channels of examination are used simultaneously. This is why telephonic hoaxes are so easy--there is no accompanying visual appearance to be counterfeited. Metal strips were most successful when only radar, and that of one frequency, was employed. Conversely, the most successful naval mines were those which would only detonate when several different kinds of signal, magnetic, hydrodynamic, and acoustic, were received simultaneously. A decoy which simulates all these signals is getting very like a ship. From these considerations, incidentally, we can draw a rather important conclusion about the detection of targets in defense and attack: that as many different physical means of detection as

possible should be used in parallel. It may, therefore, be better in some circumstances to develop two or three independent means of detection, instead of putting the same total effort into the development of one alone."

Maxim 5: A Choice Among Types of Deception

- Where possible the objective of the deception planner should be to reduce the ambiguity in the mind of the victim, to force him to seize upon a notional world view as being correct--not making him less certain of the truth, but more certain of a particular falsehood. However, increasing the range of alternatives and/or the evidence to support any of many incorrect alternatives--in the jargon 'increasing the noise'--may have particular use when the victim already has several elements of truth in his possession.

At the risk of burdening the world with further nomenclature, it is convenient (as suggested by Daniel, et.al. (36)) to classify deception into two types: A (for ambiguity) deception, and M (for misdirection) deception. A-deception increases the ambiguity in the victim's mind and lowers the probability of a correct perception by "dilution" or multiplication of

alternatives. M-deception reduces the ambiguity in the victim's mind by having him become convinced of a particular falsehood. (Either form of deception can be accomplished, incidentally, by telling only the truth--as Lewin (9) quoted one of the "A" Force deception experts, "truths do not constitute the truth.")

A-deception can function by altering the probabilities attached to various outcomes in the mind of the opponent, diluting or burying useful information in noise and/or by altering the perceived range of options and outcomes available to the opponent. Roberta Wohlstetter's (5) classic analysis of the Pearl Harbor surprise borrowed the concepts of signal and noise from communications theory. Her dictum, "to understand the fact of surprise it is necessary to examine the characteristics of the noise as well as the signals that after the event, are clearly seen to herald the attack," has a corollary to the effect that noise can be created by the deception architect to overpower or swamp the signal. Jervis (37) also remarks on the advantages of ambiguity in international relations. Eric Ambler, in a recent novel entitled, "Send No More Roses," (38) stated the principle of A-deception elegantly and simply by having one of the story's protagonists muse: "we gave

him a Kaleidoscope to play with and he used it as a looking glass."

A simple example of an attack/defense game will show the active principle. Suppose the attacker has a choice between two locations. Likewise, the defender can choose to defend either location (for illustrative purposes, the option of allocating some of his forces to each location is omitted). Success is defined as an attack against an undefended location. It is apparent from this construct that, ceteris paribus, the attacker has a 50/50 chance of choosing an undefended location. But, what if the attacker could convince the defender that there were three possible locations for the attack? Here it follows that the success probability climbs to 2/3, and so forth, reaching unity as a mathematical limit when the number of threatened sites grows arbitrarily large.[7] It is, of course, necessary that the options introduced be both individually and collectively credible to the victim. As a practical matter the number of threats cannot grow arbitrarily large. Cruickshank (39), for example, recounts how this was appreciated by deception planners in connection with the invasion of Sicily:

> "It was decided, very wisely, that to mount so many threats in the Mediterranean would stretch the Germans' credulity too far. Moreover, the fact that Sicily was almost the only objective not threatened might lead them to guess the truth. To prevent this the simulated threats to north and west France, Pantelleria and Lampedusa were abandoned."

Though the foregoing discussion is deliberately (over)simplified, it clearly illustrates the principle of A-deception.

As an aside to those readers with a mathematical bent, it is tempting to use concepts from information theory in order to characterize or quantify the uncertainty/ambiguity produced by A-deception. Though it may be a convenient mental shorthand, it lacks operational significance, as Vazsonyi (40) has shown in a decision-theoretic context. Specifically, he shows via a simple (and highly readable) example that the benefits (value or utility) of information systems are not directly related to concepts of uncertainty, reduction of Wiener-Shannon uncertainty or entropy. It is, in fact, trivially easy to construct decision-theoretic examples where the entropy is high yet the value of information is zero, as well as problems where the entropy is low and the value of information is high.

The value of information (and/or costs of misinformation) is a composite function of the a priori probabilities of chance events in the decision tree and the utility or value attached to these outcomes--a relation that is not captured by the usual information measures.

In contrast to A-deception, M-deception (or misdirection) reduces uncertainty--after Whaley, "...the ultimate goal of stratagem is to make the enemy quite certain, very decisive, and wrong" (emphasis in original). In the attack/defense game, M-deception would involve convincing the victim to defend one site, then attack the other. To the extent this can be achieved, the value of the game also approaches unity.

Deception schemes used in practice are typically composites of the two variants, usually with one or the other type dominant. Such was the case at Normandy, for example. The multiple attack location threats in the initial stages are evidence of A-deception. In the end phases, however, Normandy was predominently an M-deception. We know of no data that directly address the relative efficacy of these types, though there are normative arguments in favor of M-deception (4). Deception professionals seem to prefer M-deception,

though it can be alleged that this reflects stylistic motives. Who can resist the ultimate triumph of "the sting?"

Maxim 6: Axelrod's Contribution: The Husbanding of Assets

- There are circumstances where deception assets should be husbanded despite the costs of maintenance and risk of waste, awaiting a more fruitful use. Such decisions are often susceptible to rational analysis.

WINDOW, later renamed CHAFF by the Americans, was easily the most cost effective ECM/deception device introduced in World War II (29). It was developed independently by the British, the Germans (who called it Düppel), and the Japanese (who called it Giman-shi, meaning deceiving paper (41). There was initially a great debate amongst the British as to whether and/or when it should be used. This concern arose because the British did not have a countermeasure and feared German reprisal. The same concern was felt in Germany where, under Goëring's orders, all the relevant reports concerning German developments were destroyed. The British debate, which lasted some 16 months, culminated

in Churchill's decision to "Open the Window" (42). Shortly thereafter, it was used by the RAF to great effect on the night of 24/25 July 1943 in a raid on Hamburg. Whether this delay in deployment was an enlightened decision (as has been argued by Price (43) and by Watson-Watt (44) or, ("like the Colonel on the River Kwai some of our own authorities [a reference to Watson-Watt] most closely associated with radar could hardly bring themselves to face a countermeasure...[to a]...system they had built up" (45)) a case of emotion dominating reason as Jones has argued, it furnishes a concrete illustration of a more general dilemma. That is, how and when to employ a depreciable asset that is perhaps costly to maintain.

It is also interesting to note that concern over whether an asset will become valueless once used or that, upon compromise, an effective countermeasure can and will be developed are often overly pessimistic. In spite of the agonizing over the first use of CHAFF, it is still considered effective in today's sophisticated electronic warfare environment. Similarly, in the use of double agents, a refusal to believe the asset is other than genuine has been observed to continue in the face of strong evidence of hostile control.

Axelrod (1) furnishes other examples of this same type; employment of Ultra in World War II, the Syrian decision to withhold use of its new SAM air defense despite losses until the "opportune" time in the 1973 war and the use of double agents by Britain in connection with the Normandy deception. He also presents a simple yet useful mathematical model to gain quantitative insight into the problem. A concise technical statement of this model and solution is provided in Figure 5. The essence of the problem examined by the model is this: should a given opportunity be taken and an immediate gain achieved even though the asset may subsequently be valueless, or should the asset be saved in expectation of better gains to come? If the asset is saved rather than used, there is a cost of maintenance and risk of compromise. The optimal solution to this problem takes the form: if the value of the opportunity exceeds a threshold that can be calculated, in principle, use the asset, otherwise save it. The optimal threshold is a function of the distribution of opportunities, risks of compromise, and costs of maintenance. Ceteris Paribus, the optimal threshold,

FIGURE 5: A CONCISE STATEMENT OF AXELROD'S GAME

1. The player is presented with an infinite sequence of opportunities, i=1,2,...

2. When an opportunity is presented the player can elect to use the resource, and receive a value, Ex_i, where E is a known constant (the enenhancement factor) and x_i is the outcome or value of the i^{th} opportunity. Alternatively, the player can wait and defer a decision until the next opportunity, in which case a cost, $-x_i$, must be paid.

3. If the resource is "used" on any opportunity, there is a probability, Q, that it "survives" and can be used again, and 1-Q that the game will terminate.

4. If the resource is "saved" on any trial, there is a probability, D, that the game will terminate, and 1-D that it will continue until the next trial. Equivalently, D can be viewed as a discount factor from trial to trial.

5. The values on successive trials are independent with known and common density function, f(x).

6. The optimal policy is to define a threshold, t, and use the resource if $x_i \geq t$, otherwise to save it.

7. The value of the game, $V(t^*)$, and the optimal threshold, t^*, can be determined by univariate optimization of the function:

$$V(t^*) = \max_t \left[V(t) \right] = \frac{Ep(t)\bar{S}(t) - (1-p(t))\underline{S}(t)}{D+(1-D)(1-Q)p(t)}$$

where $p(t) = \int_t^\infty f(x)dx$, $\bar{S}(t) = \int_t^\infty xf(x)dx$ and $\underline{S}(t) = \int_0^t xf(x)dx$

for continuous distribution or appropriate sums for discrete distributions.

- increases as the likelihood of compromise given use increases--i.e., if the asset is less likely to be able to be used again, bigger stakes are required to justify its use, and
- decreases as the discount factor increases and/or the cost of maintenance increases.

Both of these results are in accord with intuition. What is somewhat unexpected, however, is that, for opportunity distributions that are highly skewed (many opportunities of low value and progressively fewer of high value) as might be expected in practice, the optimal threshold is not highly sensitive to the above factors. Moreover, for highly skewed distributions of future opportunity the analysis shows that it pays to wait for high stakes (big opportunities) despite risks of compromise and/or costs of maintenance. This latter finding is particularly intriguing as, according to Axelrod (46);

> "Turning the perspective around, one can see that it would be a mistake to evaluate the opponent's resources for surprise by what you have seen when the stakes were low or moderate. He may be rationally waiting for an event with sufficiently large stakes to justify the exploitation of whatever resource for surprise he has."

Thus (recall the discussion regarding the law of small numbers), not only is it hazardous to draw inferences from limited data, given an assumed constancy in stakes, but also rational analysis suggests that an opponent's behavior may well be different when the stakes are high. That is, prior experience may simply be irrelevant.

Maxim 7: A Sequencing Rule

- Deception activities should be sequenced so as to maximize the persistence of the incorrect hypothesis(es) for as long as possible. In other words, "Red-handed" activities should be deferred to the last possible instant.

This principle follows from Jervis' Hypothesis No. 14, "actors tend to overlook the fact that evidence consistent with their theories may also be consistent with other views." (47). Jervis illustrated this with an example from World War II--the Allied surprise at the German attack on Norway. According to his sources, the Allies had detected German ships moving towards Norway but misinterpreted the fact because they had expected an attempt to break through the Allied blockade into the Atlantic. The point is raised in Jervis' paper as a fallacy in the interpretation of evidence. In this

context, however, it is an active principle designed to exploit this tendency to misperception.

Successful deception planners have always understood this principle intuitively. While discussing a deception operation which took place shortly after Anzio in the Italian campaign, Sir David Hunt observed almost as an aside (48),

> "This shows, incidentally, one of the reasons why we decided against leading with the left handed punch from Anzio: that the enemy reserves were in that neighborhood. It also shows the advantage of the deception plan in that an attack in strength on the Rapido front would be exactly what the enemy would expect as the first move in an attack even if the main move was to be a seaborne landing or eruption from the bridgehead. After all, we had done exactly the same at the time of the Anzio landing in January. Accordingly he might be expected to be slow to put in his reserves against it until we had shown our hand." (Emphasis added)

Deferring the riskier portions of a deception may also have the advantage that even if the deception plan is compromised, the opponent will have insufficient time to recover and take appropriate action.

Maxim 8: The Importance of Feedback

- A scheme to ensure accurate feedback increases the chance of success in deception.

The above principle is logically virtually self-evident. Such an idea has evolved independently in many disciplines. It pervades most of control theory, has a counterpart termed "the value of perfect information" in decision theory, and is a central idea in the theory of games (particularly extended games). As "Comebacks" it is a British contribution to the jargon of the espionage/covert action trade (49).

Perhaps the most dramatic example of the role of feedback in wartime deception was the intelligence provided by ULTRA, the top secret espionage and cryptographic breakthrough that enabled the British to read the German Codes. In the view of many, ULTRA information was a key element in the success of the Allied invasion of Normandy. As Lewin (50) remarked:

> "[Colonel John] Bevan, head of LCS, and [Lt.-Col. T.A.] Robertson, head of BIa section of MI5, have jointly testified to the author that without ULTRA the great web of deception spun round the Germans could never have been devised. Yet without their efforts, OVERLORD might have been a disaster." (Emphasis added.)

Even at the simplest operational level, feedback

answers the question, "Is anybody listening?" (i.e., is this channel effective), a sine qua non to the design of effective deception. It is an interesting footnote to the overall success of the Allied D-Day deceptions that those directed at Norway were not successful. According to Kahn (51):

> "...most of the energetic Allied radio deception in the north of Britain to simulate the preparations of an invasion force went unheard by the Germans. The reasons seem to be that not one of the radio reconnaissance units of the German 20th Army, occupying Norway, was paying the least bit of attention: all were far away in Finland, facing east and listening hard to the Russians. The consequence was that Roenne concluded that any landings in Norway would be secondary; Meyer-Detring concurred. Hitler believed the same thing, since he thought the main invasion would come in France. Yet he never withdrew a single soldier from Norway to oppose this main assault. Why? Because it was his "zone of destiny" in the war owing to its ability to protect his shipments of Finnish nickel ore, his northern flank, and his U-boat departures. But Allied deception had nothing to do with all this. Hitler kept major forces in Norway entirely on his own volition."

This is an interesting example of how deceptions can seem to fail, yet "succeed." In practical terms, such misinterpretations of our observed response, or lack thereof, often result from less than perfect understanding and modeling of the deception target.

Ironically, the Allies knew through ULTRA that German troops remained in Norway and concluded on the basis of this feedback that the deception was successful.

As Lewin (52) noted:

> "On Sherlock Holmes' famous principle about the importance of the dog that did not bark in the night, the significant fact for the deceivers in London was that no such major movement of troops from Norway was disclosed on Ultra up to and beyond the time of D-Day. Here was clinching evidence that the deception plans were working."

--evidence consistent with one hypothesis may also be consistent with other views (where have you read this before?).

Maxim 9: "The Monkey's Paw"

- Deception efforts may produce subtle and unwanted side effects. Planners should be sensitive to such possibilities and, where prudent, take steps to minimize these counter-productive aspects.

Deception security is one of the causes of such side-effects. One of the cardinal principles of deception folklore is that deception security is of the

highest importance. It is generally acknowledged that the number of witting personnel should be minimized, even to the point of misleading your own forces. Professor R.V. Jones, with a keen eye of irony recounts one example where concern over security as well as uncertainty of success of a deception operation resulted in an unnecessary mobilization of forces. Citing an example from World War I, Jones writes (53):

> [another feint took place in August 1916]..."with the object of relieving pressure on the British front line by diverting German troops to prepare for a British invasion of North Belgium. Hall built up the intelligence picture for the Germans by providing clues that would lead them step by step to the desired conclusion. Besides carefully spread rumors, Hall arranged for signals to be sent to ships in the bogus code instructing them for their tasks in conveying the invasion fleet in the groups starting from Harwich, Dover, and the mouth of the Thames, where a fleet of monitors and tugs was being concentrated. As the final touch, he arranged for a bogus edition of the Daily Mail to be printed and withdrawn, allowing a few copies to be sent to Holland; some of these appeared to be of a later censored edition, the others uncensored. The censored copies had one item missing, of which the headline ran, "East Coast Ready. Great Military Preparations. Flat Bottom Boats," and the article reported the large concentration of troops in the eastern and southeastern counties. Can we see here the ancestor of the deception plan for D-Day in 1944?
>
> The ruse was successful, and the Germans moved a large number of troops to the Belgian coast; but it had an awkward consequence. British agents began to report German troop movements, and our

> authorities who were unaware of Hall's efforts concluded that the Germans must be intending an invasion of England, giving rise to the worst scare in Britain in World War I. Hall could not be absolutely certain that his efforts were the only cause of the German movements, and so he had to watch in silence."

Another example of a possible unwanted side effect of a deception operation occurred fairly frequently in World War II. As Cruickshank notes (61);

> "When the propagandists implemented a deception plan they had to steer a difficult middle course between convincing the Germans that an Allied attack was imminent, and encouraging resistance groups to go into action in support of an attack that would never materialize, who would then find themselves exposed to the full weight of German reprisals. In any case, it was bad for morale if hopes of liberation were raised by 'the voice of London' only to be dashed...But in France PWE had already cried 'Wolf' twice...and there was a real danger that French resistance would cease to believe anything London said."

Fortunately, this problem was anticipated and elegantly countered. In connection with the otherwise unsuccessful operation STARKEY, for instance, the BBC broadcast the subtle message (62);

> "Be careful of German provocation. We have learned that the Germans are circulating inspired rumours that we are concentrating armies on our coasts with

> intentions of invading the continent. Take no notice, as these provocations are intended to create among you manifestations and disorders which the Germans will use as an excuse for repressive measures against you. Be disciplined, use discretion, and maintain order, for when the time comes for action you will be advised in advance."

thus leaving it to the Germans to decide the significance of the message and the possibility it might be a clever ruse while ensuring that the resistance leaders had no basis for action whatever inference they drew vis-a-vis the imminence of invasion.

Another example of the Monkey's Paw phenomenon concerns the unanticipated consequences of an otherwise successful German use of decoy V-2 sites. As recounted by Jones (54):

> "Here the Germans, perhaps following their experience of our bombing of their V-1 sites, sought to decoy us with spoof sites for their V-2 rockets. Actually, we had a very incomplete picture of their rocket organization in France, until we landed on D-Day and afterwards captured a map showing the deployment of the rocket organization west of the Seine. This included not only the actual storage sites with legends bearing their actual capacities, but also the spoof sites as well. These were individually numbered from 15 to 20, running east to west. It was therefore a fair inference that there were 14 spoof sites east of the Seine, and it was reasonable to assume that German thoroughness would have decided on a fixed ratio of spoof sites per rocket stored on a genuine site. On this assumption, it was possible to

> estimate the number of rockets stored east of the Seine, and hence to estimate the intended monthly rate of fire. The answer came out at about 800; after the war we found that the intended rate of fire had been 900 a month. We had therefore managed to achieve a 12 percent accuracy in our estimate, which would not have been possible had the Germans not tried to deceive us."

A final example offered in this connection dates from 1940/1 in East Africa. Gen. Wavell wanted the Italians to believe that he was planning to attack them in Abyssinia from the south of a position. In this way he hoped to divert Italian forces from the point of intended attack in the north. But, according to Mure (64 emphasis added):

> "The deception went very well and the Italians fell for the story of the attack in the south, with a result which was exactly the reverse of what Wavell wanted. They draw back in the south, presumably in the expectation that the attack there was bound to succeed and the damage to their forces would be less if a withdrawal was made perhaps to a shorter line and no pitched battle was joined. At the same time, they sent what they could spare to reinforce the Northern Flank where they did not expect an attack but which was the true British objective. The valuable lesson learned was that the deception plan must be based on what you want the enemy to do, never on what you want him to think. Next time, also in Abyssinia, Dudley arranged for the Italians to find out exactly where the British attack was to be made and this ensured that there was no opposition!"

The point to be drawn from the foregoing examples is that there may be subtle costs to a deception which should enter into the deceiver's cost/benefit calculus. It is unrealistic to expect that all of these possibilities can be foreseen ab initio. Nonetheless, a sensitivity to such possibilities is desirable.

Maxim 10: Care in the Design of Planned Placement of Deceptive Material

- Great care must be exercised in the design of schemes to leak notional plans. Apparent "windfalls" are subject to close scrutiny and often disbelieved. Genuine leaks often occur under circumstances thought improbable.

Two incidents can serve to illustrate this principle. Early in World War II a German aircraft heading for Cologne became lost and made a forced landing near Malines in Belgium. The three passengers, two Wehrmacht officers and a Luftwaffe Major, were soon arrested by Belgian authorities. Taken to the police station and left alone briefly, they made an attempt to burn some documents they were carrying--top secret documents containing the attack plans for Holland and Belgium. The documents failed to burn and fell into Belgian hands. According to Schellenberg (55);

> "The western powers were, of course, shocked and alarmed when at first they saw the plans for the attack. However, they finally decided that the documents had been placed in their hands by the Germans purposely in order to mislead them. They probably could not imagine that we had been guilty of such a crass blunder." (Emphasis added).

A second example occurred in the North African campaigns. Alam el Halfa, a ridge roughly 15 miles behind the Alamein line was a natural stronghold, an excellent defensive position for the British at that stage in the war. It could, however, be outflanked by the advancing Germans who might be able to press on to Alexandria. The British maps of the area were excellent, being based upon captured Italian maps corrected by aerial photographs. One type of British map was thought particularly valuable by both armies, the so-called "going map." This map showed color-coded regions denoting how difficult the terrain was, and what speeds could be maintained by various vehicles. The British decided to print a false "going map" showing that an outflanking movement would present rough going whereas the route direct to the Alam el Halfa region was easily passible. The map was secretly printed and placed in an armored car to be captured by the Germans in a latterday version of the Meinertzhagen haversack

ruse. The plan worked and the Germans came directly to Alam el Halfa (over rough going, incidentally). Some two months later, General von Thoma, then Commander of the Afrika Corps, was taken prisoner and talked freely to the British. Sir David Hunt (56) recalled:

> "...he mentioned in particular the "going maps" which were so greatly sought as prizes. One of them, he said, had been of great use before the battle of Alam el Halfa because they had intended to make a wide outflanking movement but had fortunately been saved from this by the opportune capture of a map in an abandoned armored car which showed they would have run into bad going. The plan was accordingly changed before the attack. Like Lady Bracknell, I thought it wrong to undeceive him."

The foregoing two examples show both kinds of misclassification error; in the Belgian case a real windfall was dismissed as false, in North Africa a false map was accepted as real. Ironically, contrary to what might be expected, false positives and false negatives appear to be more the rule than the exception. Whaley (57), for example, in an analysis of the original cases in the data base involving receipt by the victim of detailed documents about the attacker's plans, observed that in four out of five cases true leaks were dismissed as plants, whereas in five out of five cases false plans were accepted as real!

A common feature of the successful deception efforts is that they were designed to co-opt skepticism by requiring some participation by the victim; either a physical effort in obtaining the evidence or analytic effort in interpreting it. Cave Brown, in writing the story of the Normandy deceptions (58) captured this idea well when he wrote:

> "As Bevan pointed out, masses of misinformation could not simply be handed over to the Germans. It would have to be "leaked" in bits and pieces in indirect and subtle ways from places far from where the main battle would be fought. No one knew better than Bevan that intelligence easily obtained was intelligence readily disbelieved; it was the cardinal rule of deception. The Germans would have to work for the "truth," and once they had pieced it together, after much labor and cost, a convincing whole would emerge..." (Emphasis added).

Sir John Masterman, who was a principal participant in the XX Committee charged with the responsibility of running double agents during World War II makes the identical point (59):

> "You cannot baldly announce to the enemy that such an operation is in preparation or that such and such a division is being trained to invade North Africa or Norway. What you have to do-granted that you control the major part of the German intelligence service-is to send over a great deal of factual information, introducing into it those facts from which the German intelligence staff will

> deduce your (deception) intentions. Moreover, you cannot just volunteer information. The agent's first duty is to answer questions passed by the Germans, and therefore you must by your answers guide subsequent questions in the direction you desire." (Emphasis in original.)

The danger to the foregoing advice is that it is possible to be too subtle with consequent risk of failure. Masterman (60), for example, recounts a frustrating deception failure:

> "On one occasion an agent was deliberately run in order to show the Germans that he was under control, the object being to give them a false idea of our methods of running such an agent and thus to convince them that the other agents were genuine. The theory was sound and the gaffes committed were crass and blatant, but the object was not achieved, for the simple reason that the Germans continued to think of the agent as being genuine and reliable."

There is, thus, a delicate balance to be struck between obviousness and subtlety with the attendant twin risks that the message will be either misunderstood or dismissed as a plant. To the aficionados, this is the essence of the craft.

Turning These Around: Implications for Counter-Deception

Though the above principles are framed in terms of what factors are associated with deception success, they have implications for countering deception. Thus, for example, the injunction to capitalize upon a victim's preconceptions (Maxim 1) suggests that it is important to examine one's own "givens" for exploitable weaknesses, a manifestly correct if not altogether pleasant conclusion; witness the unpopularity of the advocatus diaboli. Similarly, Jones' Lemma cautions against overreliance upon one channel of information and suggests the benefits of redundant "sensors" to detect incongruities. A third example is Axelrod's caution to consider the stakes involved when evaluating the historical record of an opponent's choices.

Time and space constraints do not permit a full elaboration of the counter-deception implications of these principles -- a work deferred for the future.

A Need to Broaden the Perspective

The above maxims were developed principally in the context of military rather than political cases, though

there appears to be some transferability (preconceptions, the law of small numbers, etc.). It may be useful to develop a data base, similar to that cited here, containing cases of political deception. Though certaintly a laborious undertaking, the possible benefits to analysis are likewise substantial.

ENDNOTES

1. See, for example, the works of Axelrod (1), Ben-Zvi (2), Handel (3), Whaley (4), and Wohlstetter (5).

2. See, for example, Cave Brown (6), Johnson (7), Jones (8), Lewin (9), Reit (10), Stevenson (11), and Winterbotham (12).

3. See, for example, Betts (13), Jervis (14), and Kirk (15).

4. It should be noted that the strategic cases considered are those that ultimately culminated in a battle. Other cases that did not result in an actual engagement are not included. There is some evidence to suggest that inclusion of these cases would lower estimates of the success of deception. An example of an unsuccessful deception effort was COCKADE, the overall deception plan for 1943, intended to tie up the German military awaiting a notional Allied invasion across the Channel. COCKADE did not culminate in a military engagement and thus is not in the data bank. (See Cruickshank (39) for a more pessimistic assessment of the success of deception efforts in World War II).

5. Referring to "...the classic situation which General Magruder exploited at Gaines's Mill: they had merely to persuade the enemy to continue to believe what he already wanted to believe" (Lewin (20)). Lewin's source for this Civil War analogy is Bruce Catton (21). Other accounts of the action at Gaines's Mill (see Freeman (22)) would credit Lee or Jackson with the wisdom rather than Magruder.

6. The following table shows the upper 95% confidence estimate (one sided) for a proportion when no instances of some event are observed in a sample size of N.

n	Upper 95% Confidence Limit
2	.776
3	.632
4	.527
5	.451
10	.259
15	.181
20	.139
30	.096

Reference: Natrella, M.G. Experimental Statistics, National Bureau of Standards Handbook 91, U.S. Government Printing Office, Washington, D.C. (1963), Table A-23, pp. T-41, et seq.

7. Further, a value of "1" is attached to the outcome associated with the attack of an undefended position and "0" otherwise. The resulting two-by-two, zero sum game has the payoff structure,

		DEFENDER	
		Site 1	Site 2
ATTACKER	Site 1	0	1
	Site 2	1	0

and the optimal solution is a mixed strategy of (1/2, 1/2) for both the attacker and defender, resulting in a value of 1/2--numerically equal to the probability that the attack will occur against an undefended position. Suppose now, that the attacker can broaden the options and convince the defender that there are three threatened locations. The resulting three-by-three, zero sum game,

		DEFENDER		
		Site 1	Site 2	Site 3
ATTACKER	Site 1	0	1	1
	Site 2	1	0	1
	Site 3	1	1	0

has optimal mixed strategies (1/3, 1/3, 1/3) for both the attacker and defender, and a value of 2/3--a quantity larger than that of the first game. Multiplication of options thus increases the likelihood of success. It is evident that the value of this game is (N-1)/N, as the number of options is increased and approaches unity (complete success) as the number grows large.

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