ELSEVIER

Evolution and Human Behavior 23 (2002) 245–264

Evolution and Human Behavior

Is military incompetence adaptive? An empirical test with risk-taking behaviour in modern warfare

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Received 14 May 2001; received in revised form 6 July 2001; accepted 22 August 2001

Abstract

In battles, opponents exhibit positive illusions in both believing they can win. With great costs of failure and uncertain success, this represents extreme risk-taking behaviour. Conflict may be expected if one side is cornered, a sacrificial pawn in an overall war strategy, or demanded into action by politicians. However, in many cases even patently weaker forces fight despite nonviolent options. This is "military incompetence", a failure in the assessment of winning probability. Previous explanations (stupidity, psychological deviance and cognitive constraints) have been rejected. Recently, Wrangham [Evol. Hum. Behav. 20 (1999) 3.] proposed that such risk-taking could be adaptive through one of two effects: (1) Performance Enhancement through exaggerated resolve or (2) Opponent Deception by bluffing. Although adaptive if they confer a tendency to win, both processes promote risk-taking behaviour and are therefore potentially responsible for military incompetence. These hypotheses can be distinguished because the Performance Enhancement hypothesis predicts positive illusions in any type of conflict. In contrast, the Opponent Deception hypothesis predicts them in battles but not in surprise attacks, where lack of communication disables any bluff. We conducted a test of these hypotheses using data collected by the US Historical Evaluation Research Organisation, mainly from the Arab–Israeli and Second World Wars. The

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PII: S1090-5138(01)00087-3

Opponent Deception hypothesis is supported over the Performance Enhancement hypothesis, but other explanations are not ruled out.

Keywords: Military incompetence; Positive illusions; Risk-taking; Battles; Raids; Performance enhancement; Opponent deception

> There is nothing on earth so stupid as a gallant officer.
>
> (The Duke of Wellington. Cited in Regan, 1987).

> Judging from the attitude of some historians, a putting together of psychology and history is, to say the least, bad form, while a putting together of psychology and military history is positively indecent. [One] reason is a distrust of reductionism — of the idea that anything so complex as a military disaster could possibly be reduced to explanations in terms of the workings of the human mind, and this by a psychologist (of all people).
>
> (Norman Dixon, 1976).

1. Introduction

Human decision-making has been shown to violate rational choice theory in a variety of contexts (Kagel & Roth, 1995; Tetlock, 1998) and some of the most intriguing and important examples concern how people perceive and react to risk (Kahneman & Tversky, 1979; Levi & Whyte, 1997; Levy, 2000; Tversky & Kahneman, 1986). Most notably, people appear to be consistently risk averse towards potential gains, but risk prone towards potential losses. This has important implications for economics (Kagel & Roth, 1995) and for understanding triggers for war (Levy, 2000). It has become fashionable to translate the results of these mostly laboratory studies to explain real life phenomena, even though the underlying theory is not well understood (Levy, 2000). This encourages the view that such biases are "maladaptive"—tendencies or traits that are detrimental to the bearer. However, since cognitive processes are thought to be under strong selection pressure to serve evolutionary functions (Barkow, Cosmides, & Tooby, 1992), apparent anomalies in rational decision-making may be (or may have been), adaptively significant even if their immediate consequences appear to be detrimental. Human risk sensitivity appears to span political and cultural boundaries (Kagel & Roth, 1995; Levi & Whyte, 1997), implying that it is a trait generalisable to all humans. This perspective gives virtue to tests of adaptive as well as nonadaptive hypotheses for judgement biases and provides an alternative to the growing number of reports that humans appear not to conform to cherished economic models of rationality (Simon, 1985). As Tetlock (1998, p. 902) states, "the study of social cognition would benefit from a more nuanced analysis not only of when particular response tendencies 'hold up', but also of when those tendencies prove especially adaptive or maladaptive". Here, we test adaptive hypotheses for "military incompetence", a phenomenon of enormous risk-taking that has, until recently, been addressed exclusively by maladaptive explanations.

Human conflict can be separated into "Raids" and "Battles". Raids are premeditated surprise attacks on unsuspecting victims, which occur in chimpanzees *Pan troglodytes* as well as virtually all preindustrial human cultures (Keeley, 1996; Wrangham, 1999a; Wrangham & Peterson, 1996). They conform to expectations of evolutionary theory because they can be implemented at will with a reasonable chance of success, while providing specific functional benefits which enhance reproductive success (Chagnon, 1997; Keeley, 1996; Vayda, 1968, 1969; Wrangham, 1999b). Battles, in contrast, give both sides the opportunity for prior assessment, so both sides apparently believe they can win even though one will lose and incur enormous costs for zero, or low, gain. One would, therefore, expect a premium on an accurate assessment of the probability of winning (Parker, 1974). However, belligerents often appear to exhibit "Positive Illusions" (Taylor, 1998; Wrangham, 1999a) in their assessment of winning probability, and fight even though the odds are against them.

Of course, there are reasons why an even patently weaker force might willingly fight (de Mesquita & Lalman, 1992; Fearon, 1995). For example, they may be cornered, defending their homes, pressed to action by political leaders (Cohen & Gooch, 1990), sacrificial pawns in an overall war strategy, or simply confident of having superior tactics, equipment or morale compensating for numerical inferiority (Dupuy, 1990, 1994; Wrangham, 1999a).[1] However, in many cases, weaker sides apparently fight as a result of a poor assessment of the probability of winning, and even though there may be nonaggressive options open to them. This phenomenon has occurred commonly enough to earn the title "military incompetence" and to become the subject of numerous books and articles (Clark, 1961; Cohen & Gooch, 1990; David, 1997; Dixon, 1976; Gabriel, 1986; Hughes-Wilson, 1999; Judd, 1973; Perlmutter, 1978; Perry, 1996; Regan, 1987, 1993; Tuchman, 1984). Here, we follow previous authors (Dixon, 1976; Wrangham, 1999a) in focussing on a specific and apparently widespread form of incompetence in which belligerents harbour Positive Illusions—overestimating their own strength and underestimating that of the opponent.

2. Competing hypotheses for military incompetence

Wrangham (1999a) reviewed the three main hypotheses for military incompetence. Firstly, stupidity has been suggested to be responsible, since soldiers often appeared to be "lions being led by donkeys" (Clark, 1961), as illustrated by the persistent but hugely costly frontal attacks of WW I and the American Civil War (Alexander, 1993; Dixon, 1976; McWhiney & Jamieson, 1982). However, military leaders are, in general, clearly intelligent people (Wrangham, 1999a) even if they do sometimes make bad decisions (Dixon, 1976; Regan, 1987), so this idea has been abandoned.

Secondly, Dixon (1976) proposed that emotional or cognitive incompetence of particular commanders is responsible for military incompetence. He suggested that men promoted to positions of senior command are prone to cognitive dissonance, risk taking, and anti-

[1] Here one must distinguish these explanations of risk acceptance in battles from those in wars. Guerrilla warfare and civil conflict are characterised by weaker forces, but individual engagements need not be.

intellectualism because, he argued, military institutions select for precisely such characteristics. However, monarchs and politicians, not subject to this bias, were responsible for the majority of conflicts throughout most of history but also committed incompetence (David, 1997; Dixon, 1976; Judd, 1973; Perry, 1996; Regan, 1987; Tuchman, 1984). Furthermore, Dixon suggests that it is particular individuals who make consistently bad decisions, but even "the most able commanders have erred on occasions. Grant at Cold Harbour, Lee at Gettysburg, Fredrick the Great at Kolin, all made errors which, judged in isolation, could have earned them the title of 'incompetent'" (Regan, 1987, p. 12). Further still, groups, rather than individuals, often make decisions in war but these also result in military incompetence (Hinde, 1993),[2] and may even exacerbate their effects (Wrangham, 1999a).

Thirdly, various cognitive biases (reviewed in Tetlock, 1998) result in consistent judgement errors that potentially lead to poor assessment and could therefore represent another cause of military incompetence. "Overconfidence bias", in particular, stems from the empirical result that people tend to overestimate the probability that their answers to questions or their assessments of certain outcomes are correct (Tetlock, 1998; Wrangham, 1999a). Such a bias could in theory account for overambition in military objectives. However, the effects are observable under only certain conditions, and disappear under others (Gigerenzer, 1991), so the idea that overconfidence bias generally relates to deficient cognition or motivation has been rejected (Gigerenzer, 1993).

2.1. The adaptive theory of military incompetence

In contrast to these maladaptive explanations, Wrangham (1999a) proposed that military incompetence is the result of an adaptive psychological mechanism, in which Positive Illusions conferred advantages by enhancing combat performance during human evolution and were therefore favoured by natural selection. Positive Illusions are well documented in empirical studies in which people consistently overrate their health, leadership ability, professional competence, sporting ability or ethics, and this applies to assessment as a team as well (Trivers, 2000; Wrangham, 1999a). A number of empirical studies (reviewed in Wrangham, 1999a) showed accurate information to be available but concealed in the subconscious until needed, implying that Positive Illusions represent a self-serving bias via self-deception and do not constitute an assessment error.

Therefore, in both raids and battles, Positive Illusions may enable individuals or groups to be more effective in achieving a goal, through a form of advantageous self-deception (Gur & Sackheim, 1979). There are two distinct processes by which self-deception through Positive Illusions might confer advantages in military contests, which are outlined below and

[2] "When a royal commission was convened in 1917 to explain the failure of the Gallipoli campaign two years earlier, Field Marshall Lord Kitchener, who had been secretary of state for war at the time, was dead. A bevy of soldiers and politicians appeared for questioning, and almost to a man they blamed Kitchener for having made the decision to undertake the campaign in the first place—thereby conveniently forgetting that it had been a communal choice" (Cohen & Gooch, 1990, p. 7).

explained in detail in Wrangham (1999a). Via these processes, Positive Illusions are hypothesised to have been adaptive if they enhanced the probability of winning conflicts in the past. However, both would also tend to promote conflict and are therefore potentially responsible for military incompetence.

2.1.1. The Performance Enhancement hypothesis (PEH)

Positive Illusions have been demonstrated in other circumstances to suppress thoughts or feelings that would interrupt progress towards a goal and to increase the chance of success as a result (Wrangham, 1999a). For example, Positive Illusions can enhance performance in sporting competitions (Starek & Keating, 1991) and play an advantageous role in coping with difficult situations and in cooperation games (Surbey & McNally, 1997; Taylor, 1989; Taylor & Armor, 1996). Positive Illusions could therefore increase the probability of winning conflicts by an enhancement of performance via increased resolve.

2.1.2. The Opponent Deception hypothesis (ODH)

An exaggerated assessment of one's own potential from Positive Illusions may increase the probability of winning via deception of the opponent, since it increases the chance of successfully bluffing the enemy into believing that he cannot, or is unlikely, to win. This applies only to battles and not to raids. As Wrangham (1999a) explains, bluffs are more likely to be believed by your opponent if you are not aware of the fallacy yourself, so self-deceptive Positive Illusions serve to prevent betraying the bluff, a theory well-developed elsewhere (Taylor, 1989; Trivers, 1991, 2000).

These two adaptive hypotheses can be distinguished because, while the PEH predicts that Positive Illusions confer advantages in any type of conflict, the ODH predicts that Positive Illusions occur only in battles and not in raids, because raids do not involve any opportunity for communication with, and hence deception of, the enemy. We therefore tested two predictions of the ODH: (1) Positive Illusions (operationalised here as attacking a force of superior strength) are more common in battles than in raids. (2) The outcomes of battles are less predictable — for any given discrepancy in force strengths — than are raids, since it is only in battles that Positive Illusions are suggested to confer an advantage that, supplementary to the advantages of force strengths alone, could bring victory. Thus, while we expect the outcome of engagements to become increasingly distinct with an increasing discrepancy in force strengths between opponents, the slope of this relationship is predicted to be steeper for raids than for battles.

3. Methods

3.1. Data selection

Despite the large amount of data available on war statistics, such as the Correlates of War database (Sarkees, in press; Singer & Small, 1972), there are very few on individual battles and assessments of performance are notoriously difficult to measure (Gartner, 1997). We used data from the Historical Evaluation and Research Organisation (HERO) study of the US Department of Defence (Dupuy, 1985; van Creveld, 1982) that records specific engagements between known military units, rather than wars or campaigns. The data used included 120 engagements in total. Most of these (67) are from WW II, of which the majority (45) are from the Italian campaign of 1943–1945 (Graham & Bidwell, 1986). The other major group is a set of 45 engagements from the Arab–Israeli Wars (Dupuy, 1978), which include 17 from the Six-Day War of 1967 and a further 28 from the Yom Kippur War of 1973. The remainder of the total are, in decreasing numerical order, 16 from France and the Low Countries in 1944, 3 each from the Eastern Front (1943) and WW I (1918), 2 each from the American Civil War (1862 and 1863) and the Napoleonic Wars (1805 and 1815) and single battles from other conflicts in France (1940), Malaya (1941), Manchuria (1945) and Korea (1950). All analyses were performed using all of these 120 cases combined. However, where sample sizes were large enough to do so, we also conducted separate analyses on data grouped by individual wars or campaigns as well. These separate data groupings were: (1) all WW II data; (2) data from the Italian campaign only of WW II; (3) all Arab–Israeli War data; (4) data on the Six-Day War only of the Arab–Israeli Wars; and (5) data on the Yom Kippur War only of the Arab–Israeli Wars.

Positive Illusions are predicted to be potentially observable in any conflict, not just in great military disasters. Nor is it predicted that only certain people are subject to them. To perform an unbiased test, therefore, we needed data that include all battles of a campaign regardless of outcome. Results would be biased if one were only to analyse battles already known to exhibit some form of incompetence and to ignore those apparently conducted competently. The HERO database includes all engagements recorded regardless of outcome, and without partisan incentive to produce any particular result. The application of interest to the researchers at HERO was the construction of a predictive multivariate model that would enable the correct classification of the victors in future engagements (Dupuy, 1985). There was, therefore, no selective input into these data and, moreover, no particular interest in military misfortunes as such. Accurate assessment of force strengths was vital and transparent to this goal. As an indication of the apparent accuracy of the data and Dupuy's (1985) analysis, his statistical model correctly predicted the outcomes of 75 out of 81 World War II battles, using a "validating data base" comprising 21 of those cases.

The HERO data also differentiated engagements resulting from surprise attack (designated here as raids), from those that both sides expected (designated here as battles). Raids therefore constituted events that permitted calculation and prior assessment of winning probability on the side of the attacker only. In contrast, both sides were aware of forthcoming battles. Surprise attacks can of course result in a drawn-out battle. However, the prediction still holds because we have operationalised military incompetence as the decision to engage in the first place. Any difference in Positive Illusions between battles and raids will therefore still be apparent in these data from the identity of the attacker. For surprise attacks, any added advantage of the surprise itself was specifically integrated into the calculation of the force strength (Dupuy, 1985). This was done by making adjustments (1) for differences in the tactical characteristics of each surprise attack, (2) for whether these were a "set-piece", i.e., whether the operation had been rehearsed in training before being carried out for real, and (3) for any post-surprise disruption inflicted on the enemy.

Positive Illusions predict that commanders commit military incompetence from an ill-assessment of their own force strength relative to the opponent. Valid tests of the hypothesis therefore require an accurate *retrospective* assessment of precisely that variable. Its measurement is, however, fraught with potential error because of the difficulties in controlling the effects of different categories of factors, such as the many differences among tactical situations, local environmental conditions and so on, which influence the actual superiority one side has over another, over and above numbers. A test simply using manpower as a variable would therefore be only a crude approximation of real discrepancies in force strengths. The HERO database provides an excellent solution to overcoming these confounding factors because it integrates detailed information for opposing forces compiled by a team of military experts. In calculating force strengths, Dupuy (1985) included heavily researched adjustments for: (1) weapon capabilities of each force, (2) terrain, (3) weather, (4) seasonal effects, (5) vulnerability of force postures, (6) vulnerability on shorelines, (7) morale factors, (8) assessment of specific mission objectives fulfilled, (9) tactical surprise factors, and (10) the advantages of air support. For the considerable detail involved in these calculations, we refer the reader to Dupuy's book. Obviously, the objectivity of Dupuy's analysis is of interest, but it probably comprises the most in-depth and painstaking project of this nature, which evolved over many years and with the efforts of numerous military and statistical advisors for an unrelated purpose. The factors not accounted for, according to Dupuy, are variation associated with the behaviour of the soldiers and the process of command—precisely the variables required in the analysis presented here.

3.2. Statistical tests

3.2.1. Comparison of incompetence in battles and raids

Military incompetence, in both battles and raids, was operationalised as attacking a force of superior strength, which is the form of incompetence postulated to arise from Positive Illusions which "...follow Dixon (1976) in focusing on a specific and widespread form of incompetence by which individuals or groups, whether soldiers or politicians, systematically overestimate their own strength and underestimate the strength of the opposition" (Wrangham, 1999a, p. 12). In raids, the attacker was always clear. In battles, one side was still defined as the "attacker"—the side that actually made the attack, even though both were aware of the impending battle. Thus, this definition only classed weaker forces as incompetent if they actually initiated the battle. This is conservative, and renders more certain the assumption that the weaker sides really were "willing" to fight. If, alternatively, we had defined military incompetence as mere participation in a battle by a weaker force, then it would mean (1) that one side in all battles is incompetent (i.e., 50% of all participants) and (2) that other confounding reasons for "having" to fight a battle mentioned in the Introduction (political pressure, being cornered etc.) may be more likely to explain the (passive) participation of the weaker side. Note that using this latter definition would enhance any effect found in our tests, since it would inflate the numbers of battles counted as incompetent, but the number of incompetent raids would remain the same.

To index discrepancies in force strengths, we used Dupuy's (1985) "force strength ratio", which was the force strength of one side divided by the force strength of their opponent. All analyses exclude cases where force strength ratios were ambiguous, which was considered to be in the range 0.9 to 1.1 (Dupuy, 1985, p. 204). All analyses also excluded ambiguous victories, which fell in the range −0.5 to +0.5 in the "result formula"—a quantitative index of combat success using a combination of data such as territory gained and mission objectives accomplished (Dupuy, 1985). The direction of the result formula indicates the identity of the winning side, while its magnitude indicates the relative success of the victors in realising their objectives. The exclusion of ambiguous force strength ratios and ambiguous victories brought the total sample size down from 149 to 120 engagements. Some campaigns within the database did not have enough data points on which to perform statistical analyses as separate groups (e.g., Eastern Front, Normandy).

Chi-squared tests were used to determine whether the proportion of attacks on superior forces was statistically greater in battles as opposed to raids than would be expected due to chance alone. A difference in military incompetence between battles and raids is predicted exclusively by the ODH. Some data groups had cells in the tabulated matrices with counts less than five, which, strictly, invalidates the assumptions of the chi-square statistic. For those cases, Fisher's Exact Test results are given, which tests the same null hypothesis and is appropriate for small sample sizes (Sokal & Rohlf, 1995). Where possible, we also included a meta-analysis across tests, deriving new P values by summing Z scores (standard normal deviates) from each of the separate tests and dividing by the square root of the number of tests (Light & Pillemer, 1984). In such meta-analyses, we could not include all of the data groupings since data of some groups overlap, constituting pseudoreplication (e.g., separate tests of the combined Arab–Israeli Wars and the Six-Day War include some of the same data).

We also determined a second measure of military "deficiency", as a failure of mission objectives despite an expected win based on force strength (and by this measure superior forces can also be incompetent). We then compared the proportion of instances of military "deficiency" in both battles and surprise attacks using the same tests as above.

3.2.2. Comparison of slopes of combat success versus force discrepancy

For a given discrepancy in force strengths, the ODH predicts that the outcome of a battle will be less predictable than the outcome of a raid. This is because, if Positive Illusions served to deceive the opponent about one's capabilities, then this will confer an advantage (and be evident) in battles but not in raids. This advantage should mean that predicted outcomes of battles do not follow from knowledge of simple differences in force strengths as closely as in surprise attacks. This can be tested by plotting the degree of combat success (the result formula) against the force strength ratio. Force strength ratio indexes the expected outcome based on discrepancies in force strength alone. Thus, the prediction is that the slope of the regression line for battle data will be shallower than that for raids because, if Positive Illusions are operating more in battles, then for any given discrepancy in force strength (i.e., any point along the x-axis), a battle is more likely than a raid to conclude in favour of either opponent. This reflects the confusion that could arise from both sides exhibiting opponent deception, or the increased likelihood of a weaker side's success if only they did so. Surprise attacks, in contrast, are hypothesised to have a more predictable outcome, since assessment of relative force strengths allows a good prediction of the likely outcome, which according to the ODH is uninfluenced by the (inapplicable) effects of opponent deception. If Positive Illusions occur in all types of conflict (as in the PEH), they will always increase the variance in outcome and no differences in slopes are predicted. Force strength ratio data were $\log_{10}$ transformed before analysis to satisfy the assumptions of linear regression (the raw data were not normally distributed).

4. Results

4.1. Comparison of incompetence in battles and raids

The Arab–Israeli Wars showed a highly significant difference in the direction predicted by the ODH, due to the data from the 1973 war in particular. The Arab–Israeli data are explored in more detail below. Among other data groupings, incompetence was not consistently greater in battles than in raids, and there was only a nonsignificant trend in the category combining all data (Table 1). However, a meta-analysis combining all results from the three campaigns (Italy, the Six-Day War and the Yom Kippur War) returned a significant overall result (overall Z score = 2.47, P = .01, two-sided test). The result is also significant if WW II and the combined Arab–Israeli Wars are analysed using the same method (Z = 2.42, P = .02). Since the chi-squared test of all data combined (Table 1) lumps all data together despite very different political and organisational circumstances, the meta-analysis reevaluates the null hypothesis on the basis of having more than one estimate, within any one set of circumstances, of whether the hypothesised effect is observable or not.

Incompetence was not more likely by one particular nation in any conflict. In all data groupings (WW II, Arab–Israeli, Italian campaign, Six-Day War and Yom Kippur War) incompetent attacks were always numerically more common in battles than in raids when

Table 1
Chi-square tests of whether attacks on superior forces were greater in battles, as compared to raids, than would be expected due to chance alone. A statistical difference (P < .05) is predicted exclusively by the Opponent Deception hypothesis

Data grouping	Chi-square statistic	N	df	Counts < 5	P	Fisher's Exact Test P value
WW II (combined)	0.02	67	1	1	.901	1.000
Italian campaign 1943–1945	0.09	45	1	2	.763	1.000
Arab–Israeli Wars (combined)	10.65	45	1	0	.001	–
Six-Day War 1967	0.46	17	1	3	.496	.515
Yom Kippur War 1973	10.22	28	1	0	.001	–
All data combined	2.20	120	1	0	.138	–

split into groups by national identity (sample sizes were too small for statistical analysis except in the case of the Arab–Israeli Wars combined, which is presented below).

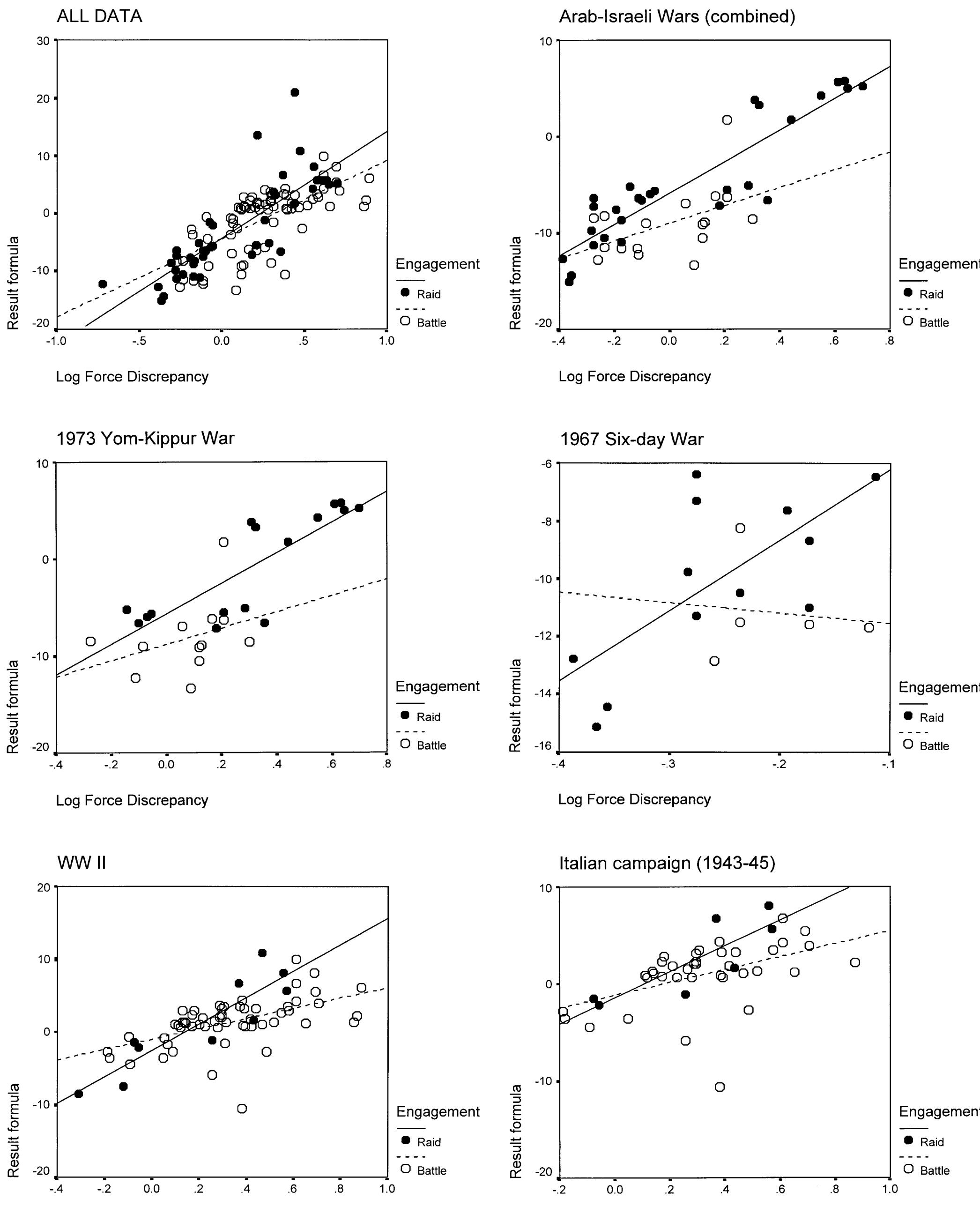

Table 2
Linear regression of success index against log force strength ratios (plotted in Fig. 1) for both raids and battles in each data grouping. The more powerful the force, the more likely it is to win and, if it won, to achieve a greater success

	Raids						Battles					
Data grouping	N	B	S.E.	r^2	t	P	N	B	S.E.	r^2	t	P
WW II (combined)	10	0.88	3.40	.78	5.01	.002**	57	0.54	1.50	.29	4.74	< .0001**
Italian campaign 1943–1945	7	0.84	3.89	.70	3.43	.019*	38	0.47	2.06	.23	3.23	.003**
Arab–Israeli Wars (combined)	28	0.91	1.47	.83	11.15	< .0001**	17	0.49	4.22	.24	2.19	.045*
Six-Day War 1967	12	0.70	7.89	.49	3.10	.011*	5	−0.12	17.11	.01	−0.21	.848
Yom Kippur War 1973	16	0.83	2.87	.68	5.48	< .0001**	12	0.36	6.99	.13	1.20	.258
All data combined	43	0.82	2.03	.67	9.13	< .0001**	77	0.68	1.71	.46	7.93	< .0001**

* Significant at < .05 level.
** Significant at < .01 level or below.

4.2. Comparison of slopes of combat success versus force discrepancies

As would be expected, with increasing force strength ratios combat success (the "result formula") was more distinct (Fig. 1). Basically, the greater the discrepancy in force strengths between sides, the more likely that the stronger one is to win and, if it won, to exact a more devastating defeat. Table 2 shows coefficients from linear regression of these variables, for both raids and battles in each data grouping. All of these relationships were significant, except for battles in the separate Arab–Israeli Wars (statistics in Table 2 indicate this was principally a result of small sample size).

Strikingly, the slope of success index against force strength ratio was always steeper amongst raid data than amongst battle data regardless of how the data are grouped (Fig. 1). The difference between these pairs of slopes was statistically significant in all data combined, WW II data combined and the Arab–Israeli data combined (statistics in Fig. 1 Legend). When data were split further the difference in slopes was no longer significant, but once again sample sizes for each slope in those cases were small. A meta-analysis combining results from the three campaigns (Italy, the Six-Day War and the Yom Kippur War) produced a

Fig. 1. Slopes of combat success versus force discrepancies for various data groupings (a–f). Slopes for raids are steeper than those for battles in all cases, in line with the Opponent Deception hypothesis. (The negative values of "force strength ratio" reflect the fact that the attacking force was sometimes the weaker of the two, thus resulting in values of < 1.0 which become negative when logged. The negative values of the "result formula" reflect instances when the superior force lost. Thus, a positive force strength ratio would be expected to result in a positive result formula and vice versa). Regression slopes for raids were significantly higher than slopes for battles in all data combined (t = 1.92, df = 116, P = .029), the Arab–Israeli Wars data combined (t = 1.76, df = 41, P = .043) and for WW II combined (t = 3.35, df = 63, P = .001). P values are one-tailed as the hypothesis is directional: the slope for raids was predicted to be greater than the slope for battles. The same directional trend was evident, but not significant, in the Italian campaign data (t = 1.49, df = 40, P = .090), the Six-Day War (t = 1.38, df = 13, P = .096) and the Yom Kippur War (t = 1.06, df = 24, P = .150). In these latter, more detailed groupings, the sample sizes for each slope are small.

significant overall result among the tests of differences in slopes (overall Z score = 2.12, P = .03, two-sided test). This is also significant when combining results for the two different wars combined (Z = 3.54, P < .0005). Thus, in line with the prediction of the ODH, battles are more likely to be won by weaker forces than raids, at any given force discrepancy, regardless of who initiated the attack.

4.3. Further investigation of the Arab–Israeli wars

Attacks on superior forces were more common in battles than in raids during the Arab–Israeli Wars of 1967 and 1973 combined, and in 1973 (Table 1), in line with the ODH. That is, weaker forces actively attacked enemies with superior force strength significantly more often in battles than in raids (Table 1). This is not because the Israelis, while winning both wars, had relatively small forces in comparison to the combined forces of the Arab alliance; Israeli forces were often superior to those of the Arabs (Dupuy, 1978; Herzog, 1984), especially in the Yom Kippur War (Dupuy, 1985). Neither was one or the other side solely responsible for the observed difference because attacks on superior forces were still significantly more common in battles than in raids when the data are separated by the identity of each side in the conflict: Israeli attacks only (chi-squared test χ_1^2 = 5.93, N = 30, P = .015, two-tailed); Arab nation attacks only (chi-squared test χ_1^2 = 5.00, N = 15, P = .025, two-tailed). What is remarkable from the data, independently of the test for the ODH (although this observation also lends support for the ODH), is that weaker forces tended to initiate battles — by a factor of 2 to 1 — even though it would be expected that, all other things being equal, this should occur only 50% of the time.

4.4. Military deficiency

We also analysed the additional measure of mission "deficiency" (see Methods). This was whether the outcome, as a relative success or failure, was as expected according to the (HERO model) assessment of relative force strengths prior to the engagement. "Deficiency" occurred more often in battles than in raids in the Arab–Israeli Wars. That is, a significantly larger proportion of superior forces "lost" in battles than in surprise attacks in the Arab–Israeli Wars (chi-squared test χ_1^2 = 5.81, N = 45, P = .016, two-tailed). One cell in the matrix had a count less than five, but a Fisher's Exact test also found this result to be significant (P = .034). This same effect on deficiency was not found for the data overall: χ_1^2 = 2.01, N = 120, P = .156, nor for WW II: χ_1^2 = 0.12, N = 67, P = .730 or for the Italian campaign in isolation: χ_1^2 = 0.09, N = 45, P = .771. There were no unexpected outcomes in the Six-Day War (so it could not be tested), but it was significant in the Yom Kippur War alone (χ_1^2 = 4.86, N = 28, P = .027).

5. Discussion

In the test of the first prediction (Table 1) there was some evidence in support of the ODH in the Arab–Israeli Wars, but this was not apparent in other data groupings although the meta-analysis returned a significant overall result. In the test of success slopes (Fig. 1), all data groupings showed differences in slope in the direction predicted by the ODH. These slopes were significantly different from each other with all data combined, combined data for WW II and the combined Arab–Israeli Wars data. The meta-analysis also indicated a significant overall result for that test. Finally, our measure of unrealised advantage (military "deficiency") showed that superior forces lost significantly more often (than expected by consideration of force strengths alone) in battles than in raids in the Arab–Israeli Wars. This does not directly bear on the adaptive hypotheses per se, because Positive Illusions predict a failure of initial assessment, not a failure to win when the odds are in one's own favour (although Positive Illusions may favour the weaker side still more if they tend to make superior forces complacent as well). However, the adaptive theory also predicts that, if they do serve an adaptive function, it sometimes pays those who would otherwise have lost (according to force strengths) to have Positive Illusions. This implies that predictability of outcome on the basis of force strength alone is lower in battles (as was found in Fig. 1). Therefore, that military deficiency was also significantly more common in battles than raids in the Arab–Israeli case also implies some support for the effects postulated by opponent deception. In combination, our results support the ODH. However, there are other potential explanations for these relationships, which cannot easily be rejected.

Firstly, risky (inferior force) attacks may occur more often in battles than in raids for several alternative reasons, such as if there is pressure to engage before the defending force is reinforced, to forestall an advance, or if there is a belief that although things are bad they will worsen.[3] Aside from the battlefield situation and the decision-making process of the commander, political pressure can also force an attack. These are, however, unlikely to cause a systematic bias in these data given that such factors are equally likely to apply to both types of engagement and to both sides. Indeed, in all data groupings, inferior attacks were independently made more often in battles than raids by both nations involved (and this was significant in the single statistically testable case—of the Arab–Israeli Wars).

Secondly, we may also observe fewer "incompetent" raids if, by their nature, they tend to be carried out by superior forces (as standard military practice, for example). This may be more typical for raids in preindustrial societies (Keeley, 1996). However, many surprise attacks were indeed carried out by weaker forces in these data, and in general raids do not necessarily demand superior forces. If anything, the opposite may often be true, since smaller forces are needed because of the advantage the surprise confers, and because of the need for stealth. Of course, raids to attack specific and limited objectives may only require a small size if they engage only a subsection of the enemy and then retreat; many allied "raids" in the Gulf War, for example, were carried out by small parties of Special Forces (de-la-Billiere, 1996; Powell, 1995). However, the HERO data do not include such limited raids, but focus on sustained clashes between large units (usually several hundreds or thousands of men on

[3] During the Falklands War, the invasion by British ground troops was brought forward, even though the tactical situation was recognised at the time as nonideal, because of an impending environmental constraint—the South Atlantic winter (Thatcher, 1994). Such variables obviously affected tactical decisions in other campaigns, such as the Wehrmacht's in Russia towards the end of 1942 (Beevor, 1998).

both sides). Most importantly, even if there was such a bias confounding data for the raids category, an explanation would still be required for why attacks on superior forces are so common among battles alone. In the Arab–Israeli battle data, attacks on superior forces outnumber those on weaker forces by 2 to 1.

Thirdly, with reference to Fig. 1, there are of course alternative explanations for why surprise attacks more commonly succeed, and may be more predictable, than battles: better planning, intelligence, disorganisation of the raided party, prearranged manoeuvres, detailed back-up plans, prearranged and targeted air support, and so on. As mentioned in the Methods, however, the tactical advantages of the surprise itself were already accounted for by adjusting force strength ratios (Dupuy, 1985). Clearly, it can be questioned how realistic that adjustment was, but the HERO data are probably the most reliable to be found and with which to test this hypothesis. Finally, inferior attackers were not more likely to win in one type of engagement or the other ($P > .265$ for all data groupings, Fisher's Exact Test). In other words, inferior forces attacked and won in an equal proportion of both raids and battles, so the results presented here were not a consequence of inferior forces performing better at one type of engagement than the other.

5.1. Is there a case to answer?

Some events will always remain unpredictable even with good information (Jervis, 1997). This might be exacerbated in this case if military incompetence is more a result of acting well on the basis of poor information, rather than acting poorly on good information. Studies of failures in battle have been criticised for tending to "oversimplify what is in reality a complex and complicated phenomenon" (Cohen & Gooch, 1990, p. 1). The highly regarded Prussian war historian Karl von Clausewitz also thought that outcomes in warfare were, at least to some extent, unpredictable: "No other human activity is so continuously or universally bound up with chance" (von Clausewitz, 1976, p. 85). It is, therefore, easy to criticise a bad decision after the event, given the numerous effects of the "fog of war" and chance. There are famous cases of inferior forces willingly taking this gamble and achieving victory, such as the inferior German forces defeating those of France in 1940 (Bloch, 1949; May, 2000) (though French complacency was one suggested cause.) Unpredictability could arise from even slight imbalances in initial starting conditions, in the nonlinear dynamical (chaos theory) sense of complex systems. Such effects would remove some degree of responsibility for disasters from the decision-maker because "men operate in environments in which events are only partly the result of controlled decisions taken by the person 'in charge'" (Cohen & Gooch, 1990, p. 19). Field Marshall Joseph Joffre is reported as being "fond" of saying that "he did not know whether he was responsible for the victory on the Marne in September 1914, but", according to Joffre, "he knew one thing—if the battle had been lost, it would have been he who lost it" (Cohen & Gooch, 1990, p. 3).

Therefore, those who maintain that military incompetence is a real phenomenon ought to demonstrate that instances of incompetence occur more often than simply due to chance alone. Unfortunately this cannot be tested statistically because we do not have a null model of how often incompetence "should" occur. However, of the total 120 engagements analysed here (among both battles and raids), 41 (34%) involved an inferior force carrying out an attack on a superior enemy, and 22 of all 120 engagements (18%) resulted in a superior force losing (regardless of who attacked). These proportions were similar for WW II: the attacker was inferior in 19/67 cases (28%) and superior forces lost in 9/67 cases (13%) (for Italy only, these proportions were, respectively: 17/45 [38%], 5/45 [11%]). For the Arab–Israeli Wars, the attacker was inferior in 18/45 cases (40%) and superior forces lost in 12/45 cases (27%) (for Six-Day War: 2/17 [11%] and 0/17 [0%]; for Yom Kippur War: 16/28 [57%] and 12/28 [43%]). Some form of incompetence, or at least of ill-assessment, therefore seems to be relevant in a considerable number of engagements. More generally, if one is to believe authors such as Dixon (1976), Regan (1987) and Tuchman (1984), distinct incompetence has been a consistent and commonly repeated feature of human endeavour for at least 3000 years regardless of nation, class, and political regime. These figures and literature provide some evidence that, although a comparison with chance or "systems effects" (Jervis, 1997) remains impossible, military incompetence of some kind is certainly frequent. Finally, there is an important case to answer because, even if we accept the problem as exceptionally confounded, if blind chance were responsible for (say) 90% of outcomes, understanding the mechanisms responsible for the remaining 10% is still, surely, a useful endeavour. Such criticisms are certainly no reason to avoid performing tests of why military incompetence occurs.

5.2. Support for the importance of opponent deception

The idea that deception is important in warfare is certainly not new. The ancient Chinese writer Sun Tzu (6th century BC) wrote that "all warfare is based on deception". Early European tacticians often spread out their formations in vast (but thin) lines to give the impression of immense forces (McNeill, 1995). There are numerous other examples of deception and counterintelligence in warfare (Hughes-Wilson, 1999). Obviously, these involve conscious cognitive processing in achieving deception. But if deception is so important and apparently successful in conscious strategy, it may also be important in unconscious strategy. Unconscious strategies, like a cat puffing out its fur, or vocal and visual mimicry, abound in nonhuman animal conflict (Dawkins, 1986; Maynard Smith & Price, 1973; Parker, 1974). It is therefore reasonable to postulate that such unconscious strategies may also be present in humans. Involuntary shouting during conflict is a compelling possibility; the Scottish Highlanders were legendary for their formidably noisy attacks, and there are accounts of the fear it induced in their enemies which inhibited concerted defence or caused them to flee (Dodds, 1996). It is the fact (and style) of attack that would serve as the mechanism by which Positive Illusions lead to deception. Observable material strength cannot be bluffed easily, but resolve can be. Since an aggressor should have weighed up his chance of winning, the fact of his attack, even if with seemingly weaker forces, could successfully imply (the bluff) that the force is more powerful than is apparent. This could be believed for a number of credible reasons independent of numerical strength, such as that the attackers have better morale, organisation, weapons, or that they have approaching reinforcements.

5.3. Support for the existence of positive illusions

Are there reasons to suppose the belligerents in these conflicts underestimated each other and experienced some Positive Illusions that they could win? At least from the Arab–Israeli conflict, examples abound. From 1973: "At every level Israel underestimated her enemy" and "discounted the Arab's ability to learn from past mistakes" (Hughes-Wilson, 1999, p. 257). Israeli Chief of Staff David Elazar said of the Syrian forces (10 days before the war) "We'll have one hundred tanks against their eight hundred...That ought to be enough" (Thomas, 1999, p. 199). Israeli combat superiority was certainly claimed to be higher than that of their enemies (up to a factor of 2) by the HERO study (Dupuy, 1985). On the other side "The Egyptians pondered long and hard on the Israelis' failings, chief of which, they decided, was a potentially fatal overconfidence caused by a combination of arrogance and a superiority complex from constant victory" (Hughes-Wilson, 1999, p. 228). "Egypt's *psychological* advantage had to do with Israel's complacency about its invincibility and a certain racist assumption about the inferiority of Arab soldiers" (Thomas, 1999, p. 199, his italics). To compensate for Israeli confidence, there have been some interesting statements made about Arab self-confidence. Dupuy (1985, p. 137) wrote "There was...an Arab cultural tendency to allow emotion and wishful thinking to influence planning, evaluation and operational leadership". According to a Palestinian Arab "We are emotional rather than coldly analytical. Honour is exaggerated at the expense of real need. We would *like* to see certain things and we think they *are*" (Patai, 1976, his italics; cited in Dupuy, 1985, p. 138). Dupuy (1985, p. 138) also states that an Egyptian general gave a view of this cultural tendency to him "in almost identical words". Leaving these anecdotal impressions aside, Egypt certainly seems to have believed in itself in 1973 because "for Egypt to cross the Suez Canal to establish a beachhead on the east bank was considered impossible by all military observers" (Thomas, 1999, p. 198). From 1967: "Hysteria seized the Arab world. Nasser was again at the peak of popularity, as one Arab government after the other volunteered support and was caught up in the enthusiasm of the impending war" (Herzog, 1984, p. 149). These anecdotes do two things. They highlight the potentially confounding historical and cultural factors. However, they also suggest that leaders do not make accurate assessments—overestimating their own strength and underestimating that of the enemy, and therefore appear to exhibit something like Positive Illusions.

In general, many wars *began* with Positive Illusions about how quickly they could be fought and won. There has been an "unrealistic overconfidence in rapid victory which has characterized so many military adventures...it was a notable feature of the Boer War, of the First World War, of the Second World War and even, through what was by now a quite extraordinary incapacity to profit from experience, of the Suez crisis and Bay of Pigs fiasco" (Dixon, 1976, p. 45). We can now add Vietnam, the Falklands, Afghanistan, Yugoslavia, Somalia, Rwanda, Chechnya and the Congo as examples of Positive Illusions in the ability to achieve military aims quickly and with relative ease.

Finally, Positive Illusions may manifest themselves as a bottom-up as well as a top-down phenomenon, since public opinion and domestic politics can push for aggressive decisions based on biased assessments (de Mesquita & Lalman, 1992; Morgenthau, 1973). Our focus on the decision to fight implicates commanders and military planners. However, Positive Illusions may originate from soldiers and civilians who are also (often) aware of impending battles. For example, the first Battle of Bull Run in the American Civil War was attended by many civilian spectators from Washington DC and General Scott, the commander of the numerically superior Union forces, was apparently forced by *public opinion* to attack the Confederates with what he considered to be an undertrained force — and lost (N. Wiener, personal communication).

6. Conclusions

Our analyses of battles from recent history provide some support for the hypothesis that Positive Illusions exist in accordance with the Opponent Deception hypothesis. Positive Illusions may or may not be adaptive any longer in human conflict, but as a persisting trait they could certainly explain the prevalence of risk-taking behaviour in warfare and be responsible for military incompetence. Obviously, conflicts in our evolutionary past differ in many respects to "modern" warfare (defined as post-gunpowder, say) and since about 1870 commanders no longer have a direct overview of the battlefield (Cohen & Gooch, 1990; van Creveld, 1985). However, there is no reason to expect that Positive Illusions would have disappeared, because modern warfare is relatively recent and because incompetent commanders (away from the front) are unlikely to be selected out of the population as a result of their mistakes.[4]

All previous hypotheses proposed in the literature for military incompetence have been maladaptive explanations. However, theory expects that cognitive processes should be adapted to salient evolutionary problems (Wrangham, 1999a) and empirical studies show that assessment failures, in particular, are found less often in evolutionarily relevant tasks (Barkow et al., 1992; Cosmides, 1989; Cosmides & Tooby, 1992; Gigerenzer & Hug, 1992). This indicates that military incompetence is unlikely to be due to a maladaptive ineptitude to make accurate assessments, especially if intergroup hostility has been as widespread in human prehistory as suggested by the archaeological, ethnographic and primatological evidence (Keeley, 1996; Vayda, 1968, 1969; Wrangham & Peterson, 1996). The widely documented phenomenon of Positive Illusions (Gur & Sackheim, 1979; Taylor, 1998; Taylor & Armor, 1996) is therefore likely to be highly relevant to competitive conflict. A primary focus in past and present studies of combat has been an emphasis on morale, something akin to Positive Illusions. Morale is widely recognised to be an important determinant of battle success, so we may expect Positive Illusions to have a perceptible effect on the outcome of conflict over and above differences in physical force strengths alone. As Napoleon said: "In war, the morale is to the physical as three to one".

[4] There are, of course, exceptions to this: the Frankish Knight who charged into a sea of Saracens at the battle of Acre in 1291, even after his compatriots had already turned and fled (Regan, 1987, p. 20) and the American Civil War officer, John Sedgwick, whose last words were "They couldn't hit an elephant at this distance," immediately prior to being killed by enemy fire at the battle of Spotsylvania in May 1864 (Sherrin, 1995).

Psychological biases (such as risk-taking) may also develop due to the adaptive nature of learning processes, resulting in acquired behaviour developed in one circumstance that may be maladaptive when applied to another. Therefore, apparent stupidity, or cognitive constraints, might represent learned behaviour from training or experience, rather than hard-wired biases, but which would also provide alternative explanations of instances of military incompetence. Future tests of Positive Illusions in military incompetence would ideally involve content analysis of what commanders were actually thinking during the decision-making process, providing a test for direct evidence of harbouring Positive Illusions in contrast to other forms of rationale. Most interesting and important would be an examination of whether the adaptive theories proposed by Wrangham (1999a) are relevant to understanding incompetence, ill-judgement or risk-taking behaviour by political leaders in international relations and actual wars, rather than just military incompetence in battles. There are reasons to believe that in such contexts, Positive Illusions may indeed be generally observable but also least desirable. As Tetlock (1998, p. 878) wrote, “The mistaken belief that one is militarily superior to a rival may generate risky policies that can lead to costly wars that no one wanted”.

Acknowledgments

We would like to thank Dominic Tierney, Brian Hare, Mike Wilson, Paul Johnson, Richard Tolcher, Roger Johnson, David Smith, Andrew Lodge, Guy Winkworth, Catharina Braden and Duncan McCombie for advice, comments and criticism. We also thank Neil Wiener and another anonymous reviewer for criticism of the manuscript.

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