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# **Feeding Terror! How Bin Laden Rewards Terrorist Groups, An Economic Interpretation.**

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# **Feeding Terror: How Bin Laden Rewards Terrorist Groups**

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# Feeding Terror: How Bin Laden Rewards Terrorist Groups

Raul Caruso\* – Andrea Locatelli†

**Abstract:** *The article aims to apply the insights of Contest Theory to al Qaeda's recruitment process. From this point of view, al Qaeda can be considered as a contest organizer rewarding an indivisible prize – namely, official membership and economic rewards – to candidate extremists groups. Would-be terrorists must then compete with each other to prove their commitment and ability. Candidate terrorist groups compete by maximizing their efforts to win the prize, i.e. maximizing the number of casualties. Eventually, al Qaeda reaps the benefits of the most successful attacks in the form of a huge return in terms of image, while paying a limited price. This model also has important policy implications for counter-terrorism. Firstly, as al Qaeda's main incentive to prompt competition is spreading a common knowledge about the entity of the prize, action should be undertaken in order to falsify and confuse the kind of information that aspirant terrorists receive. Secondly, since al Qaeda's reward is as ideological as economic, efforts should be dedicated to tracking down and possibly halt financial flows before they are used to reward the applicants.*

**Keywords:** Terrorism, al Qaeda, Contest Theory, Counter-terrorism.

**JEL CODES:** D72, D74, J49, D8, D62, H4.

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## **Introduction**

The aim of this article is to analyze al Qaeda's *modus operandi* in light of the economic theory of contests. From this point of view, al Qaeda can be considered a contest organizer rewarding an indivisible prize – which we assume to be official membership and economic rewards. The contest is then joined by candidate terrorist groups that compete by maximizing their efforts to win the prize, i.e. maximizing the number of casualties. As we will see, this logic has various pros and some cons. In order to devise an effective counterstrategy, governments should target the key elements of this contest: al Qaeda's communication strategy and the setting of the prize.

This article is divided into three sections. The next paragraph will describe al Qaeda's main features according to the prevailing literature. Section two presents some insights drawn from the economic theory of contests, in order to account for al Qaeda's relationship with its cells. Finally, section three will briefly discuss some tentative strategies for counter-terrorism.

## **Why is al Qaeda different from previous terrorist organizations?**

When compared to traditional terrorist groups, al Qaeda displays several novel elements. Among its defining features, Audrey Kurt Cronin suggests four main characteristics: (a) fluid organization, (b) methods of recruitment, (c) financing instruments and (d) the use of communication media<sup>1</sup>. While all of them are relevant when it comes to framing a sound counterstrategy, for the purposes of our analysis it is critical to focus our attention exclusively on the way al Qaeda cells are related and interact with each other – i.e. the organizational dimension as broadly conceived.

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<sup>1</sup> Kurth Cronin (2006, pp. 32-39).

It is this feature that makes terrorists so difficult to hunt down. Indeed, thanks to the flexibility embedded in its structure, al Qaeda is continuously evolving. In fact, rather than being an organization, al Qaeda comes closer to the original meaning of its name – i.e. a concept, an idea, a mission<sup>2</sup>. In order to describe its specificity, analysts have coined a plethora of terms: network, group, movement, clique – in other words, anything denoting a flexible structure with fuzzy boundaries<sup>3</sup>. Considering al Qaeda as a network is not only in line with recent empirical findings<sup>4</sup>, but is also helpful in understanding the principles and the logic underlying its functioning.

For the whole network, the lack of a clear hierarchical line of command that is inherent in such a structure<sup>5</sup> results in flexibility and autonomy as well as in resilience to penetration and compromise<sup>6</sup>. In particular, this flexibility allows for a novel recruitment system, which is clearly crucial when considering al Qaeda's survival and spread on a world-wide scale. In fact, some recent work suggests that the recruiting process may now resemble a kind of voluntary application to join the organization<sup>7</sup>. In this view, new groups are involved in the organization as the result of a selection process amongst different volunteers<sup>8</sup>. The rise of the so-called “self starters”<sup>9</sup> is taken as evidence of this, i.e. groups with little or no affiliation with the network perpetrating terrorist attacks on their own initiative. This allows al Qaeda to extend its membership almost infinitely, simply because new groups can be affiliated at any time without an

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<sup>2</sup> As noted by many commentators, the original meaning of al Qaeda is essentially “the base”, “the foundation”, or even “the method” – which underlines the organization's catalyst role among different groups.

<sup>3</sup> Coll, Glasser (2005).

<sup>4</sup> Sageman (2004).

<sup>5</sup> Jackson (2006, pp. 247-48)

<sup>6</sup> For an in-depth discussion of networks see Arquilla, Ronfeldt (2001).

<sup>7</sup> Cozzens (2005).

<sup>8</sup> Sageman (2004, p. 110).

<sup>9</sup> Kirby (2007); Sageman (2008)

institutionalized recruitment procedure. Although this may be conjecture, it is assumed that the number of potential applicants is much higher than the promised membership. This situation is especially beneficial for al Qaeda for at least three reasons. Firstly, there is no need for bin Laden and his fellows to invest resources in any recruitment drives. Secondly, and most importantly, such an abundance of applications would allow al Qaeda to be very selective in granting membership. The only weakness of the self-starters system is that, by virtue of the spontaneous origins of would-be terrorists, the command and control capabilities are quite limited. As a side effect, therefore, al Qaeda could be cited and get stuck in actions far from the leaders' main interests. Secondly, and partially related to this last point, the potential of ideology as a common denominator should not be exaggerated, as the ideological appeal is a necessary, but hardly sufficient condition.

Proceeding in this direction, in the next paragraph we turn to the contribution of the economic theory of contests. In fact, it could be a useful theoretical framework to analyze how candidate groups voluntarily exert efforts in order to get involved in the Al Qaeda network.

It is worth noting that in recent times a different interpretation has been proposed. It has been argued that terrorist cells behave according to an open-source mechanism, but this seems incorrect to us<sup>10</sup>. This interpretation mainly focuses on the structure of the network: terrorists would be akin to developers of a free Linux-style software. There are some factors which could make this interpretation fitting: (a) the lack of a rigid hierarchical structure; (b) the de-centralized organization of the network; (c) the initiative of developers; (d) the spontaneous elitist evolution of contributors. However, there are some other factors which make such an interpretation incorrect. Needless to say, in an open-source mechanism, co-developers

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<sup>10</sup> The open-source interpretation of Al Qaeda is in Robb (2007). We are grateful to Jurgen Brauer for bringing the issue to our attention.

produce a public good<sup>11</sup>. They can consume this public good and such consumption positively enters the utility function of both developers and users. By contrast, terrorist cells produce a public bad<sup>12</sup>. They cannot consume the good itself and it cannot enter positively any utility function. Looking at the organization of the structure, there are also some characters there that limit this kind of interpretation. In the open-source mechanism, a developer faces a publicly available opportunity cost to her or his time. While developing an open-source project, he or she must give up the development of other projects. This is possible because programming skills are pervasive and simply signaled. Therefore, developers clearly face an opportunity cost which is public information. This seems not to be the case with terrorists. Since terrorism is a secret activity by definition, terrorists would not be engaged in other activities. Terrorist skills are not pervasive and, in most cases, they cannot be disclosed. The opportunity cost faced by candidate terrorists is private information.

Last but not least, in an open-source structure, developers can communicate and interact with each other. This does not seem to be the case with terrorist networks. It has been shown that, unlike conventional social networks, terrorist networks do not need to experience frequent and dense communication. Rather, in most cases ties and connections are activated only when they are assumed to be necessary<sup>13</sup>.

However, potential fruitful insights that could be still drawn from open-source interpretation relate to the motivations of developers. Open-source is characterized by two distinct incentives leading to delayed payoffs: (i) a *career concern incentive*, namely the ‘bid’ on future well-paid job offers. (ii) The *peer-recognition* (something akin to academic research).

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<sup>11</sup> See Lerner, Tirole (2002).

<sup>12</sup> A ‘public bad’ is a diffused negative externality recalling the idea of ‘atmosphere’ externality as developed by Meade (1952).

<sup>13</sup> See Krebs (2002); Brams, Mutlu, Ramirez (2006).

They both fall under the heading of *signalling incentive*, which – according to Lerner and Tirole – strongly relies on: (a) the highest possible visibility of performance to the relevant audience, (b) the highest possible impact of effort on performance, and (c) the highest perceived causality between performance and talent.

However, these elements do also fit with Contest Theory, which is expounded in the next paragraph.

### **Some insights from Contest Theory**

Drawing on Contest Theory we now try to elucidate some conditions and the logic that may underlie al Qaeda's peculiar recruiting process. There is a growing awareness among economists and other social scientists that many phenomena can be modelled as contests. A contest is commonly defined as a game in which players compete for a prize by making irreversible outlays. In other words, contests are situations in which rational agents spend resources in order to win a prize. The characteristic feature of this interaction is that resources are spent irreversibly. This does constitute the main difference with auctions, in which agents do not bear the cost of the bids entirely by themselves. This is also the rationale for labelling contests as all-pay auctions<sup>14</sup>.

Literature on contests commonly implies the concept of Nash equilibrium. A strategy is assumed to be a Nash equilibrium when no player involved has any incentive to deviate from it. The emergence of a Nash non-cooperative equilibrium commonly occurs when agents have no opportunity for coordination. This is the classical case of the prisoner's dilemma, i.e. where actors choose their favourite strategy even though it may lead to a

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<sup>14</sup> Traditional contest models are formally grounded on Tullock (1980), and found seminal explanations in O'Keeffe, Viscusi, Zeckhauser (1984); Rosen (1986); Dixit (1987). The first and seminal application has been developed by Tullock (1980) for rent-seeking phenomena.

sub-optimal result, because they are not able to coordinate. The lack of coordination leads to a non-cooperative equilibrium. In other words, as rational agents, they maximize their expected payoff. Although it seems trivial, the concept of maximizing agents becomes fundamental while analysing agents' behaviour in contests. Consider two simple examples. In a race, athletes cannot coordinate their actions. In the presence of an indivisible prize (call this winner-take-all contest) they will put in their maximum effort to win the prize. In such a case, coordination is clearly not feasible. Only one player can win. There is no alternative strategy. Agents play *à la* Nash and maximize their efforts in order to maximize their payoffs. In a similar fashion, scholars competing for research grants cannot coordinate with each other. When grants are assigned on a personal basis and there is no opportunity to agree on a pre-determined sharing of the 'cake', the only feasible strategy is to write the best possible proposal.

Hereafter we mention some common findings of contest literature that might be useful for our analysis. In particular, in our framework we are interested in accounting for agents' behavior and efforts.

To begin with, the level of the effort made by every agent is strictly correlated to the value of the 'prize' – i.e. the higher the evaluation of the 'prize', the higher the commitment to put the maximum effort into the contest will be. Second, each agent knows that the probability of winning the contest is increasing in its own effort and decreasing in other players' efforts. That is, in the simplest case of two agents, A and B, the probability of agent A of winning the contest is higher when it makes a bigger effort than agent B. Therefore, the only feasible strategy for both A and B will be exerting the maximum possible effort. This way, each player can attain maximum payoff. To recapitulate this point, Contest Theory predicts that maximizing behaviour is the strategy used by each agent. This can also be generalized in the presence of a higher number of contestants. In a multi-

agent scenario, however, the theory also predicts that total effort decreases in the number of contestants.

That is, when agents are aware that the contest is joined by more agents, individual effort will decrease. By the same token, the sum of all individual efforts increases .

Of course, these general predictions about agents' behaviour can be considered as *ceteris paribus* conditions. In general, these properties hold even when other factors impact the effectiveness of efforts. For expository reasons, we can say that it is possible to indicate two candidate subsets of interacting factors: (a) individual characteristics; (b) exogenous characteristics.

As individual characteristics, consider first the existence of different talents and abilities. Individuals as well as groups differ widely in terms of abilities. The idea of ability is 'somehow' *technological*. If you consider that a contest can be considered nothing but a production function of a monetary reward, then the efforts do constitute the 'inputs', whilst the abilities do constitute a technology translating a certain level of efforts into the probability of success. The impact of different abilities is clearer in the presence of a winner-take-all contest. Take again the example of the race. Since athletes are expected to put their maximum effort into the race, and given that their level of effort depends upon the value of the prize, they would make the same effort. In such a case, the outcome of the contest will be determined – everything else being equal – by abilities. Of course, abilities can be exogenously given and refer to personal talents given by nature, but they can also be related to some specific positive investments made by agents. Still, whatever the case, this does not really matter while analysing a contest. If they are not able to update their own abilities at different stages of the game, their efforts will be fruitless.

As exogenous conditions, consider the design of the contest. That is, the agent providing the 'prize' of the contest can somehow modify the

architecture of the contest in order to influence the total effort exerted. The simplest case is that of providing different prizes. This is commonly the case with sport contests where prizes are offered for the winner but also for the runner-up. Moldovanu and Sela<sup>15</sup> offer a brilliant theoretical contribution in this respect. They show that in the presence of concave cost functions, only one prize is the optimal design which does maximize efforts. By contrast, in the presence of convex cost functions, different prizes may constitute an optimal design. Put differently, when the efforts are increasingly costly – that is when the cost increases as the contest goes on – different prizes do constitute an optimal choice for the design. In fact, when rational agents know that several prizes are provided – given the information available about other contestants’ abilities – they will put their maximum effort into the contest. In fact, even if they are aware that they cannot win the contest, they also expend the maximum effort to get the other prizes. This is the case in sports such as cycling, where different prizes are provided by organizers and then the total efforts of participants is maximized. By contrast, when the cost function is not convex –does not increase with the effort – only one prize leads to the best design. In such a case, the designer’s objective is also maintained. The level of total effort is maximized. Offering only one prize guarantees that no player will give up. This is true in particular when players do not have information about other contestants’ abilities.

The few lines above were based on the implicit assumption that agents involved in a contest are symmetric apart from their own abilities. A difference in abilities clearly recalls an idea of ‘asymmetry’ that is common among students of political science. Asymmetry however can take different shapes. In the realm of strategic interactions, what is also affecting agents’ behaviour is asymmetry in terms of available information.

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<sup>15</sup> Moldovanu, Sela (2001).

The simplest case refers to asymmetry in the evaluation of the prize. That is, without any public disclosure, agents can evaluate the ‘prize’ of a contest differently. Since the level of effort is positively correlated to the value of the prize, different evaluations of the stake lead to different levels of effort made by agents<sup>16</sup>. Nti analyses the case of a contest where participants evaluate the ‘prize’<sup>17</sup> differently. The common result of this analysis is that agents that evaluate the stakes more highly make a bigger effort in the contest than low-evaluation participants. In particular, Hillman and Riley show that asymmetric evaluation deters participation by low-evaluation agents. Consider a contest with only two players, A and B, with identical abilities. If A retains a higher evaluation of the prize, it will exert itself more, and as a consequence will be the favorite. Agent B, the ‘Underdog’, will exert itself less. Therefore, increasing the favourite’s valuation increases its effort, but decreases the effort of the underdog. This result may hold even if Agent B (the low-evaluation agent) has superior abilities.

In other words, this states that asymmetry in the evaluation of the prize can be a driving force. To sum up, some inferences drawn from Contest Theory may apply to our framework:

1. All players maximize their own effort;
2. in the presence of asymmetry in the evaluation of the prize, low evaluation players may give up;
3. low ability players may also give up;
4. the probability of cooperation among players is very low;<sup>18</sup>

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<sup>16</sup> Hillman, Riley (1989).

<sup>17</sup> Nti (1999); Nti, (2004).

<sup>18</sup> However, the possibility of collusion between heterogeneous agents in a contest has been analyzed in Caruso (2008).

How does al Qaeda fit into the theory expounded above? In this view, al Qaeda may be portrayed as a contest organizer providing an indivisible prize to the best terrorist group. From time to time, bin Laden and his fellows may start a competition among groups loosely related to the network. The prize could be assumed to be some sort of ideological blessing (being accepted as a full and honourable member of the organization) as well as economic reward<sup>19</sup>. More important than that, for our purposes, are the insights that we can get from Contest Theory on the way these candidate cells compete with each other.

The key feature shaping this process is given by information. In a sense, the term relates to the fact that all the participants are privately informed about their abilities – in other words, each group knows how much it can achieve, but is unaware of the others' potential. This, in turn, creates a favourable condition for the contest designer, since all groups are forced to give their best and maximize their efforts. In a second sense, information can be seen as the process used by groups to signal their commitment and ability (and, conversely, as the way bin Laden monitors their actions). When it comes to terrorist attacks, monitoring and information costs are close to zero: in fact, when a terrorist group bombs an embassy or a trade centre with dozens of casualties somewhere in the world, the event is extensively broadcast by international mass media<sup>20</sup>. As a result, the link between effort and rewards is quite direct: the greatest effort is supposed to guarantee the prize. Or, put differently, each group knows that in order to win the prize it will have to maximize the number of casualties. Moreover, since the groups can evaluate the prize to be rewarded

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<sup>19</sup> It is established that al Qaeda has given grants to local groups that devised promising plans for attacks. See on the point Bruce Hoffman (2003).

<sup>20</sup> In a recent article Rohner and Frey demonstrated empirically that media attention and terrorism do mutually Granger cause each other,. See Rohner and Frey (2007).

differently, a spontaneous partitioning between high-ability and low-ability groups is to be expected.

The implication of such logic is twofold. On the one hand, contrary to common wisdom, mass killing and the resulting psychological effect is not an end in itself, but rather a means for aspiring groups to win al Qaeda's prize. In this view, target selection – as in the case of train stations, malls and hotels – is not just the consequence of ideological considerations, but rather a matter of tactical calculation: these sites host hundreds of appealing targets, are easy to strike, and highly visible in terms of media coverage. A second implication is that, according to the model, a terrorist action *per se* is not enough to automatically grant membership. Eventually, as a sort of *ex post* franchising<sup>21</sup>, al Qaeda reaps the benefits of the most successful attacks in the form of a huge return in terms of image, while paying – all things considered – a very limited price.

### **Conclusion**

In the previous paragraphs, we attempted to apply insights drawn from Contest Theory to explain some of al Qaeda's most puzzling features. As witnessed by the plots unveiled in London and Glasgow in July 2007, terrorist actions look more like the result of self-starters' initiatives than elaborate, centralized, top-down plans. This practice represents a departure from the past – and a truly problematic one. In fact, from a counter-terrorism perspective, the rise of autonomous violence-prone groups found Western intelligence basically unprepared. In the words of the British Intelligence and Security Committee's Report, *'We remain concerned that across the whole of the counter-terrorism community the development of the*

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<sup>21</sup> See Farah, Finn (2003); Benjamin( 2003).

*home-grown threat and the radicalization of British citizens were not fully understood or applied to strategic thinking*<sup>22</sup>.

When explaining al Qaeda's recruitment process, Contest Theory also sheds some light on the role of information and communication in connecting the various nodes which constitute the structure of al Qaeda's network. The meaning of communication is usually conceived broadly, and it merely refers to the use of mass media or the Internet by bin Laden and his fellows. Mastering advanced technologies proved critical in al Qaeda's ability to talk to multiple audiences – like potential new members, hostile governments and public opinions worldwide. However, this perspective blurs the line between internal and external communication. The model provided by Contest Theory, on the other hand, unveils the relevance of the internal front of communication – i.e. the way information circulates among various bodies of the organization. As mentioned, for bin Laden most of the advantages of starting contests derive from asymmetrical information: in fact, collusion among competing groups is hindered by a lack of knowledge of each others' abilities and motivations; likewise, scarce information on the criteria used to allocate the prize forces competing groups to maximize their effort. On the other hand, there are also some weaknesses implicit in this system: the logic of group competition inherent in contests makes sense only under certain conditions, such as private and asymmetric information. Moreover, even though so far this process has appeared to be self-sustaining, action can be undertaken in order to make it ineffective.

Consequently, the policy prescriptions that emerge from our analysis lead to two broad courses of action. The first one is to discredit bin Laden's promise. Or, in more sophisticated terms, to falsify and confuse the kind of information that terrorist candidates receive. In fact, the implicit assumption of any contest is that the organiser will certainly reward the winner. So, the

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<sup>22</sup> *Government Response to the Intelligence and Security Committee's Report into the London Terrorist Attacks on 7 July 2005*, May 2006.

success of a contest rests to a large extent upon trust. Undermining the trust extremist candidates feel would presumably weaken the process of recruitment. Perhaps it is up to the intelligence community to perform this task. In fact, secret services may adopt different instruments to interfere with al Qaeda's communication. However, this is a very sensitive issue, since evidently the risk involved in some intelligence practices for democratic countries is to disregard individual freedoms in favour of public security<sup>23</sup>. Terrorist violence would certainly not be eradicated, but it would be much harder for bin Laden to sustain the credibility of the contest among groups with its deadly impact on targets.

The second prescription concerns funding. Needless to say, insofar as bin Laden's reward to self-starters is monetary, hindering al Qaeda's capacity to redistribute funds becomes a critical issue. This can be done by breaking down the flow of money at the lowest level of the chain – i.e. before it gets into local groups' hands. If counter-terrorism can deny them their economic reward, bin Laden's credibility as a contest organizer will be challenged. Then, counter-terrorism would have to track financial flows in order to prevent local groups from enjoying rewards for their actions.

Apparently, the insights suggested in our analysis are limited by the lack of reliable information on the network. In other words, since no public confession or statement has been made by al Qaeda operatives on bin Laden's rewarding strategy, we have to focus exclusively on the output of the process – obviously, al Qaeda's attacks. As a consequence of this limit, several paths for future research are open. In particular, future analyses should investigate in depth the terms of the contest. How does bin Laden initiate a contest? How does he reward the successful applicants – i.e. what weight do ideological blessing and monetary remuneration<sup>24</sup> carry? Is the

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<sup>23</sup> Wilkinson (2000).

<sup>24</sup> In fact, whenever the agents are partitioned into status categories according to their performance (top-class, low-class, and so on), a reasonable hypothesis is that

contest entered into by several participants simultaneously, or do applicants play sequentially until bin Laden's goal is achieved? Finally, how does one jam or deter this strategy?

Admittedly, these questions are beyond the limits of our analysis. Perhaps, addressing these questions will require refining – not to mention amending –the interpretation presented here.

### **References**

Arquilla, J. and D. Ronfeldt, eds. 2001. *Networks and Netwars: The Future of Terror, Crime and Militancy*, Santa Monica: RAND.

Benjamin, D. 2003. "Are the Sparks Catching?" *Washington Post*, 23 November 2003.

Brams S.J., H. Mutlu, and S.L. Ramirez. 2006. "Influence in Terrorist Networks: from Undirected to Directed Graphs.", *Studies in conflict and Terrorism*, vol. 29, No. 7, pp. 703-718.

Caruso R. 2008. "Reciprocity in the Shadow of Threat." *International Review of Economics*, vol. 55, No. 1/2, pp. 91-111.

Coll, S. and S. Glasser. 2005. "Terrorists Turn to the Web as Base of Operations." *Washington Post*, 7 August 2005.

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the terrorist groups involved in this kind of contest care more about their relative 'status' than about the potential monetary reward. Social and cultural considerations connected to a concern for relative position do constitute important determinants affecting the performance of agents. This kind of behaviour can be strengthened in the presence of a deep ideological and religious motivation. See on this point Moldovanu, Sela, Shi (2007).

Cozzens, J. 2005. "Islamist Groups Develop New Recruiting Strategies.", *Jane's Intelligence Review*, February 1.

Dixit, A. 1987. "Strategic Behavior in Contests." *The American Economic Review*, Vol. 77, No. 5, pp. 891-898.

Farah, D. and P. Finn. 2003. "Terrorism, Inc.: Al-Qaida Franchises Brand of Violence to Groups across World." *Washington Post*, 21 November 2003.

Farley, J. 2003. "Breaking Al Qaeda Cells: A Mathematical Analysis of Counterterrorism Operations (A Guide for Risk Assessment and Decision Making)." *Studies in Conflict and Terrorism*, Vol. 26, No. 6, pp. 399-411.

Hillman, A. and J.G. Riley. 1989. "Politically Contestable Rents and Transfers." *Economics and Politics*, Vol. 1, No. 1, pp. 17-39.

Hoffman, B. 2003. "The Leadership Secrets of Osama bin Laden: The Terrorist as CEO." *Atlantic Monthly*, April 2003, pp. 26-27.

Hoffman, B. 2004. "The Changing Face of al-Qaida and the Global War on Terrorism." *Studies in Conflict and Terrorism*, Vol. 27, No. 6, pp. 93-104.

International Institute for Strategic Studies. 2004. *Strategic Survey 2003/4*, Oxford: Oxford University Press.

Kirby A. 2007. "The London Bombers as 'Self-Starters': A Case Study in Indigenous Radicalization and the Emergence of Autonomous Cliques", *Studies in Conflict and Terrorism*, Vol. 30, No. 5, pp.415-428.

Krebs, V.E. 2002, "Mapping Networks of Terrorist Cells." *Connections*, Vol. 24, No. 3, pp.43-52.

Kurth Cronin, A. 2006. "How al-Qaeda Ends. The Decline and Demise of Terrorist Groups." *International Security*, Vol. 31, No. 1, pp. 32-39.

Jackson, B. 2006. "Groups, Networks, or Movements: A Command-and-Control-Driven Approach to Classifying Terrorist Organizations and Its Application to Al Qaeda." *Studies in Conflict and Terrorism*, Vol. 29, No. 3, pp. 241-262.

Lerner, J. and J. Tirole. 2002. "Some Simple Economics of Open Source.", *The Journal of Industrial Economics*, vol. 50, No. 2, pp. 197-234.

Meade, J.E., 1952. "External Economies and Diseconomies in a Competitive Situation", *The Economic Journal*, Vol. 62, No. 245, pp. 54-67.

Moldovanu, B. and A. Sela. 2001 "The Optimal Allocation of Prizes in Contests." *American Economic Review*. Vol. 91, No. 3, pp. 542-558.

Moldovanu, B., A. Sela, and X. Shi. 2007. "Contests for Status." *Journal of Political Economy*, Vol. 115, No.2, pp. 338-363.

Nti, K. 1999. "Rent-Seeking with Asymmetric Valuations." *Public Choice*, Vol. 98, pp. 415-430.

Nti, K. 2004. "Maximum Efforts in Contests with Asymmetric Valuations." *European Journal of Political Economy*, Vol. 20, pp. 1059-1066.

O’Keeffe, M., K. Viscusi and R. Zeckhauser. 1984. “Economic Contests: Comparative Reward Schemes.” *Journal of Labor Economics*, Vol. 2, No. 1, pp. 27-56.

Robb, J. 2007, *Brave New World: The Next Stage of Terrorism and the End of Globalization*, San Francisco: John Wiley & Sons.

Rohner D., Frey B.S., 2007, *Blood and Ink! The Common-interest-game between terrorist and the media*, “Public Choice”, Vol. 133, pp. 129-145.

Rosen, S. 1986. “Prizes and Incentives in Elimination Tournaments.” *The American Economic Review*, Vol. 76, No. 4, pp. 701-715.

Sageman, M, 2004. *Understanding Terror Networks*. Philadelphia: University of Pennsylvania Press.

Sageman, M, 2008. *Leaderless Jihad. Terror Networks in the Twenty-First Century*. Philadelphia: University of Pennsylvania Press.

Tullock, G. 1980. “Efficient Rent Seeking”, pp. 97-112 in J. Buchanan, R. Tollison and G. Tullock, eds. *Toward a Theory of the Rent-seeking Society*. College Station (TX): Texas A&M University.

Wilkinson, P. 2000. *Terrorism Versus Democracy: The Liberal State Response*. London: Frank Cass.