

London Calling: The Economics of Riots

A Rational Choice Theory for Aggravated Collective Behavior

Katarina Elisabeth Haukaas



Environmental & Development Economics Master's
Programme

Department of Economics

UNIVERSITETET I OSLO

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*“A fact without a theory
Is like a ship without a sail,
Is like a boat without a rudder,
Is like a kite without a tail.
A fact without a figure
Is a tragic final act.
But one thing worse
In this universe
Is a theory without a fact.”
- George Shultz*

Summary

The focus of this research is in the area of behavioral economics, with a concentration on the decision-making process of individuals who may potentially participate in an aggravated collective action. Such a study is important as it sheds light on the motivations behind the actions taken by individual rioters and thus the riotous group. This provides an understanding of the evolution of a riot as well as an evaluation of the costs and benefits it generates. The research approach adopted in this study includes a review and interpretation of quantitative data from a historic riot, and the development of a model for the decision-making process of a potential rioter. The findings from this research provide evidence that individual rioters' assessment of costs and benefits is dependent on the number of individuals rioting. Furthermore, an individual evaluates differently under a sufficient level of stress due to reduced cognitive abilities. Reduced abilities cause a short-sidedness in the individual's evaluation and decision-making process. The result is that an individual will be biased towards the variables representing short-run benefits which are dominated by intuitive reasoning. This leads to the utility seeking individual being more likely to choose participation. In sum, the main conclusion drawn from this study is that the act of rioting can be deemed as a rational choice in economic terms. This work recommends that further research be conducted in this area. Specifically, that further inquiries be made into the rationality of aggravated collective action and that experimental research be conducted so that the model presented here can be tested and further examined.

Keywords: Riot, Collective behavior, Rational choice theory, Conditional decision theory, Threshold model, Dual-processing model, Effects of stressors, Behavioral economics, Decision-making model, Group dynamics

Foreword

The progression and evolution of economics is driven by the sum of daily actions taken by individuals around the world. The repetition and transformation of one action affects another, until the accumulation of them all creates a larger outcome. The importance of the individual in this process set into motion my desire to explore the inner workings of the decision-making process as well as the explanations of human behavior in economic literature.

This search then evolved into a curiosity about the rationality behind certain decisions and how rationality is defined in the literature. It was at this juncture that the end goal became to ascertain if actions, which seemed economically unexplainable at first glance, could in fact be explained as a rational choice. Several perplexing real world examples steered this inquiry, eventually landing on riots as the focal point and case of study for this investigation.

After focusing on riots, a model was developed which appeared both instinctive and plausible for describing a rioter's destructive and aggravated behavior. This model supports complimenting theories and concepts, which when infused together provide an explanation for how an extreme action in an extreme circumstance could be seen as rational at the time of decision.

There is an endless list of people that I would like to recognize and thank for their role in this paper. I would like to first and foremost thank my adviser Kjell Arne Brekke, for his words of wisdom, guidance and role in developing this paper. I would like to thank the Department of Economics as well as the University of Oslo for their outstanding direction and training. I would also like to give my heartfelt thanks to my Dad and my dear friends Lill and Ingrid for their open ears and eyes, which provided support and feedback for this work. Last but most definitely not least, I would like to send warmest thanks to my Mom, my brothers, my very special aunts and my wonderful friends for all of their love and encouragement.

To the reader, I hope you will enjoy this work as much as I enjoyed writing it.

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1 Introduction

The decision to initiate or join a riotous event often seems perplexing at first glance. However it is with a second look and deeper evaluation, that this choice can be explained as rational. This thesis will discuss two alternative explanations of the riots. Both explanations incorporate Granovetter's Threshold Model of riots (1978), but hold somewhat different accounts for the individual preferences. One explanation is consistent with standard rationality and based on the assumption of stable preferences, where riots present easy gains through looting with low probabilities of penalties. The alternative explanation uses dual system theory and presents rioters as less rational. This alternative argues that being in the midst of a riot changes individuals' preferences towards a lower emphasis on long term consequences. While there is clearly evidence of reduced probabilities of penalties, this work argues that at least some of the observations from the 2011 London Riots support the dual system explanation.

The term 'riot' is often defined in studies of collective action as an event closely resembling an offense against the ordinary social order in the form of a gathering or demonstration, which is committed by three or more persons against person or property, and includes the use of violence (Lachman, 1996) (McPhail and Wohlstein, 1983). In this study, the term 'riot' is fixed as: an offense against the ordinary social order committed by a number of individuals; this number must then be sufficiently large for the potential participant performing the analysis to deem it as a riot. The decision to riot is defined as rational for each individual based on an analysis of the costs and benefits for that individual. The individual is deemed rational if their preferences are utility maximizing, internally consistent and seek the optimal level of information (Kahneman, 2011). In others words, if the individual seeks the highest net gain with a consistent end goal in the most efficient manner, they are considered rational.

Riots are a useful example of situations where the rationale behind certain actions, at times, can be perceived as unclear. One riot stood out among the others as

particularly puzzling, the London Riots of 2011. After reading the firsthand accounts and commentaries from the London Riots, an intriguing question emerged. What could motivate the participants to cause destruction on such a large scale, when it knowingly carries large costs for the nation as well as for the individual? Moreover, could these actions be explained by standard economic theory?

The development of the London Riots were triggered “on Thursday, August 4, 2011, upon the death of Mark Duggan, a Tottenham Black resident” after “a peaceful vigil of 200 people” for the deceased suddenly “escalated rapidly” into violence (Bev, 2011, Kindle Loc. 39, 40). The setting of the vigil was the London borough of Tottenham, which “is considered one of the most ethnically diverse neighborhoods in Europe with people speaking more than 200 languages” (Bev, 2011, Kindle Loc. 42-43). The death of Mark Duggan was “allegedly caused by police shooting in a Scotland Yard operation on gun and drug-related activities” (Bev, 2011, Kindle Loc. 40). The initial cause for collective action was noted as holding little significance for the majority of the riots participants (R.C. & V.P., 2011; 2012). Once initiated, activity began to multiply “with unprecedented speed” and by Sunday, August 7 riotous activity had spread to twelve additional areas in London (R.C. & V.P., 2012, p. 19). By the end of the riots on August 10, thirty-one areas within London had reported over 40 crimes each (R.C. & V.P., 2011; 2012).

In the case of the London Riots, as with many others, there was a moment and group responsible for its initiation. The group in London was one that had already formed to commemorate the deceased. But the action of the group is not necessarily an unanimously agreed upon decision. It is with the recognition that a group “is not a homogenous mass, but a collection of smaller crowds and individuals with their own needs, wants and expectations,” that this study’s focus is transferred from the group to the individual (Challenger, Clegg & Robinson, p. 275). One individual in the group wishes to express their emotions in a more vocal or even destructive manner. Then another sees the active individual and is swayed into activity. A domino effect occurs and the group grows wildly, and in London without connection or concern for the initial trigger. It is as if the “truth became irrelevant” to both rioters and law enforcement alike (Tucker, 2011, Kindle Loc. 81).

It is challenging to establish an accurate number of how many participated in the days of rioting and looting. One method is to look at the number of those arrested during the riots and its aftermath, which is over 3,000 individuals (Benyon, 2012) (R.C. & V.P., 2012). However, it seems from most firsthand accounts that this number falls significantly short of portraying an accurate picture. One initial report published by the government sponsored Riots Communities and Victims Panel (R.C. & V.P.) estimated that “perhaps as many as 13,000-15,000 were actively involved in the riots” (2011, p. 24). There were also reports of the participants being of every age, race, background and affiliation. All in all, a profile for the average rioter does not appear to emerge from the accounts (R.C. & V.P., 2011). Although, it was highlighted in the final report published seven months after the riots by the R.C. & V. P. that “the majority of rioters were under twenty-four” and “that seventy percent of those brought before the courts came from the thirty percent most deprived areas” (2012, p. 115).

When reading reports and commentaries on the London Riots from local newspapers, there appears to be a recognition of some unrest in the London borough of Tottenham, but by many accounts the extreme outbursts of violence appeared sudden and unexpected (Sky News, 2011). The R.C. & V.P. reported an estimated cost of over 300 million English pounds in property damages in just five days of rioting, while the final bill was estimated to be around half a billion pounds (R.C. & V.P., 2011). There were no noticeable objectives or central targets during the riots. Much of the destruction and thievery was done opportunistically, according to firsthand accounts. Fires were started as a way of eliminating any evidence pointing to who had participated in the theft (Quinn & Adams, 2011). Stores of all sizes and types, “both large and mom-and-pop neighborhood stores,” were looted and set ablaze (Bev, 2011, Kindle Loc., 46-47). Shops were destroyed in the rioters own neighborhoods as well as in other’s. In fact, the shattered shops, cars and the living quarters located directly above the shops could have been owned by someone a rioter knew, perhaps acquaintances, friends or even relatives (R.C. & V.P., 2011).

The desire to conclude whether the choice to riot could be deemed rational became stronger after reviewing the extensive damages and costs caused during the course of the London Riots. There was public destruction and personal cost as well,

so that when all costs were fully realized in the long-run, it seemed improbable that the benefits gained from participation could outweigh the costs. This begged the question, why would an individual choose to participate when it resulted in a negative outcome? In an attempt to find the reasoning behind the decision to riot, this work turned to one of the most significant features of a riot, stress. An investigation then began into the connection between stressors and the decision-making process as well as if a riot could impose a sufficient level of stress that would impair a person's cognitive abilities. The search for the reason behind the riots then became a matter of if these decisions were the result of limited cognitive abilities, as well as if these individuals were considering, or even capable of considering, the long-run consequences of their decisions. For as much as a sufficient level of stress carries the ability to inhibit a person's decision-making process, it would likewise be capable of impairing their ability to entertain the long-run consequences of their actions (Thompson, 2010).

It is therefore the hypothesis of this study that the decision to participate in a riot can be defined as a rational act. In agreement with Granovetter (1978), this study holds that an individual's decision to participate in a riot is not only dependent on the benefits outweighing the costs, but also on the number of active participants within the population. This makes it more likely that potential rioters will choose to participate as the total number of rioters increases.

This work then gives two alternative theories for how an individual arrives at the decision to participate. One theory is supported by standard economic theory, which states that an individual performs a cost-benefit analysis as the riot grows and then makes a decision which they do not regret later. It is assumed that certain benefits increase as the number of participants increases, while certain costs are decreasing in the number of participants. It is also assumed that each potential participant's benefits will become greater than their costs of participation at a certain point that corresponds with a specific number of participants. This number of participants must be satisfied in order to sufficiently lower costs and raise benefits (Granovetter, 1978).

The second theory addresses the limitation of a potential participant's cognitive abilities and is founded in the well-established proposition that individuals

possess separate yet simultaneous dual-systems of cognitive processing (Kahneman & Frederick, 2005). The simultaneous dual cognitive processes are the system 1, related to intuitive reasoning, and system 2, related to deliberate reasoning (Evans, 2008; 2003) (Kahneman & Frederick, 2005). It is assumed that a riot has the ability to lower and limit an individual's cognitive abilities to intuitive processes when a sufficient level of stress is present (Thompson, 2010). Once the brain is held captive within intuitive thinking, it is no longer able to consider the long-run costs, such as damages to infrastructure or future tax increases exacted in order to pay for repairs (Thompson, 2010). It can then be demonstrated how the cost-benefit analysis can be limited to the short-run net gain (Thompson, 2010) (Hammond, 2000) (Toates, 1995) (Maule & Hockey, 1993). When the potential rioter is able to perform a short-run cost-benefit analysis, they are able to discount the long-run costs and focus on the instant emotional and monetary gains (Thompson, 2010). The potential rioter is then more likely to deduce that the benefits of participation will outweigh the costs by ignoring the long-run costs, making it possible for the participant to wonder about, or even regret, their decision to riot in the long-run. This makes the analysis capable of explaining why rational individuals plunge into riotous activity. Whereas the standard cost-benefit analysis demands a consideration of the long-run costs and therefore, in many cases, cannot explain how the benefits outweigh the costs for some participants.

The incorporation of the existence of a threshold requirement as well as of simultaneous dual-processing is essential for explaining the act of rioting as rational. Both explanations for participation advocate the importance of the series of decisions and the aggregation of participants in the development of a riot. One demonstrates the importance of the growing population of participants, and the other of how the individual is affected by stressors originating from the very event that they are now choosing to mimic. However it is when the two explanations are combined that a full picture is comprised that can show how there is a greater probability that benefits will outweigh costs which then supports the decision to embark on riotous behavior. Yet it is most important to note that whether the explanations are considered separately or combined, they provide evidence that the decision to participate in a riot can be deemed as rational, creating the basis for a rational choice theory for riots.

The distress and disruption caused by riots has motivated considerable interest in understanding the decision-making processes that determine a potential participant's response to a riotous environment. The sheer number of riots throughout the world points to the importance and necessity of undertaking this type of research. There is currently a lack of research directly addressing the rationality of rioters. New frontiers triumphed by empirical research are providing additional models, theories and frameworks as well as advances on older models, in order to address the decisions of potential riot participants. The models included, as addressed in The Riot Threshold Model, have individually proven themselves in a wide range of impressive work, but have yet to be combined. It is for this reason that this study investigates the decision-making process of potential riot participants.

2 Modeling

This work begins with a basic cost and benefit analysis for participation in order to make greater sense of the 2011 London Riots. The first undertaking is to define the variables that are considered to represent the most influential concerns for analysis. According to Gordon Tullock (1971) and Morris Silver (1971), certain variables are able to represent the costs and benefits of participation which then explain the decision for or against collective action. From the summation of these variables, a private interest equation is created which can then be utilized to evaluate an individual's decision-making process. Tullock's model is in fact the inspiration and basis for Silver's model and private interest equation. The sole distinction between Tullock and Silver's equations is that Silver chooses to include one additional variable.

2.1 GORDON TULLOCK'S PRIVATE INTEREST THEORY OF REVOLUTION

Gordon Tullock's Private Interest Theory of Revolution is a rational choice model which presents an individual's interest in public action as characterized by the requirement of "selective incentives" as the explanation for participation in the pursuit of public goods (Conteh-Morgan, 2004, p. 96). He constructs a model where "the public good aspects of a revolution are of relatively little importance in the decision to participate" while "the discounted value of the rewards and punishment is the crucial factor" (Tullock, 1971, p. 92). This model is summarized in Tullock's equation for the evaluation of costs and benefits of participation in a revolution. This equation is expanded on by Morris Silver. Tullock's equation is presented below in the following section with one modification, Morris Silver's single added variable at the end of Tullock's equation.

2.2 MORRIS SILVER'S EXPANSION ON PRIVATE INTEREST THEORY

Morris Silver's elaboration on the Gordon Tullock's equation maintains the same goal of quantifying the net gain of participation in aggravated collective

behavior (Silver, 1971). Corresponding to Tullock, Silver employs an equation for individual net gain or loss due to participation in a revolution. Silver's equation utilizes the same definitions and terms for the variables included. Silver then adds one variable to the equation represented by the term V , which measures "the value of the participant's time and other resources" (Silver, 1971, p. 64). This addition to Tullock is considered to create a superior representation of the potential participant's choice since it includes this basic personal cost. The equation for private interest for participation in revolutionary activity then becomes:

$$G_r = R_i \cdot L_v - P_i(1 - L_v) - L_w \cdot I_r + E - V \quad (1)$$

where:

G_r = Net gain (or loss) to individual from participation rather than remaining neutral.

R_i = Private reward (e.g., income, power, status) to individual for participation in revolution if revolution succeeds.

L_v = Likelihood of revolutionary victory assuming subject is neutral.

P_i = Private penalty imposed on individual for participation in revolution if revolt fails.

L_w = Likelihood of injury through participation in revolution.

I_r = Injury suffered in action.

E = Psychic income from participation.

V = Value of participant's time and other resources.

Here, an increase in net gain G_r will encourage and "intensify" the efforts of current revolutionaries, as well as increase the number of participants (Silver, 1971, p. 64). If the increase in revolutionary participation is sufficient, the period is defined as a revolution. Silver further clarifies that "any collective good an individual expects to be produced...will be 'consumed' by him whether he participates or remains neutral,"

and therefore the public good aspect is not a determinant of participation and can be left out of the net payoff equation (Silver, 1971, p. 64).

Since both a revolution and a riot are considered to be an accumulation of individuals participating in aggravated collective behavior, the two events can be related as social conflicts. The number of similarities and strong connection between these two types of collective behavior are supported by other studies of social conflict, such as in Oberschall (1978). In light of this connection, it is natural to assume that potential participants of a revolution consider many of the same cost and benefit variables as those who may join a riot. It is for this reason that the variables of significance for revolutionaries, as shown by the Silver Model, are utilized as the starting point for the Riot Threshold Model.

2.3 THE RIOT THRESHOLD MODEL

For the potential participant to be a rational utility seeker, the individual must pursue the action that will provide them with the maximum net gain. Consequently the net gain from participation must be higher than the net cost for the act of rioting to be defined as rational.

The Riot Threshold Model assumes that costs and benefit variables can be expressed in a similar way to the Silver Model (1971). One pivotal change is that many variables of the Riot Threshold Model are dependent on the expected number of participants in the riot at the time of decision, represented by n instead of being dependent on outcome. This modification is supported by Granovetter (1978) which demonstrates the importance of the number of participants in decisions of aggravated collective action. By making the participant's net gain dependent on n , the following equation can be seen as a formulization of Mark Granovetter's Threshold Model (1978). This addition of n to the Silver Model is further founded in the generally accepted notion that "the choice about whether to remain calm or to engage in violence is subject to the general rule that the more other people are rioting, the more likely any particular individual is to join in" (Watts, 2011, Kindle Loc. 1078-80). The increased likelihood of participation is reflected in the Riot Threshold Model. Where the cost variables that are dependent on n decrease as n increases, while the benefit variables increase as n increases, as further explained below.

Therefore, as inspired by the Silver Model (1971) and Granovetter's Threshold Model (1978), the following private interest equation for the ascertainment of the net gain or loss for each individual's cost-benefit analysis was developed:

$$G_r = R_i - P_i(n) - I_i + E(n) - C \quad (2)$$

where:

G_r = Net gain (or loss) to individual from participation rather than remaining neutral.

R_i = Private revenue and reward (e.g., income, power, status) to individual for participation in the riot.

$P_i(n)$ = Private penalty imposed on individual for participation in riot.

n = Expected number of persons participating in riot at time of evaluation and decision.

I_i = Potential for injury suffered in action.

$E(n)$ = Emotional benefit from participation.

C = Cost of individual's time and other resources.

It is assumed that $E'(n) > 0$ and $P_i'(n) < 0$.

This model presents important departures from the Silver Model. As mentioned, the net gain and private penalty for the potential participant is not dependent on the actual outcome of the conflict. The reason for this alteration stems from and is in recognition of a subtle difference in the nature of a riot versus a revolution. In a riot situation, it can be assumed that the personal gain an individual incurs during a riot does not depend on the 'success' or 'failure' of the conflict. This notion is backed by multiple accounts of historic riots, including the 2011 London Riots, which show that the majority of private revenue is acquired through looting, theft, scavenging or a recognition of participation from colleagues and neighbors (R.C. & V.P., 2011; 2012) (Quinn & Adams, 2011) (Lewis & Harkin, 2011) (Williams, 2011). Due to the origins of these personal gains and the methods by which they are

achieved, these acquisitions are typically not lost even if the riot is a ‘failure’ (Conteh-Morgan, 2004). The separation of outcome from personal gain and private penalty is additionally logical for riot situations that do not possess a specific agenda, such as increased exposure of a group, social issue or imminent crisis.

A seemingly minor yet significant change from the Silver Model is the revision of the definition of the E variable. In the Riot Threshold model the E variable shifts from “psychic income” to “emotional benefit.” This change was made in order to emphasize the effects of emotions on the decision-making process, as well as to reinforce the distinction between intuitive and deliberate choices. Another modest change from the Silver Model to the present model is the notation of one of the variables. The variable representing the cost of a participant's time and other resources is changed from Silver’s V to the current C . This change was merely made for convenience and to emphasize that the time and resources spent are costs.

The final and most pivotal departure from the Silver model is the inclusion and role of the n variable. Two of the variables in the private interest equation of the Riot Threshold Model are dependent on n , while four are independent. These variables will now be further expanded on in the order by which they appear in the private interest equation. However it should first be reiterated that it is assumed that a conflict is only defined as a ‘riot’ when the number of expected participants is greater than or equal to what the evaluator defines as a riot. In other words, n must be sufficiently high so that the individual performing the analysis deems the conflict to be a riot.

A prospective rioter is facing a potential revenue that is independent of the number of persons currently rioting. Once an individual has decided to engage in the riot, their acquisitions are not limited by the number of individuals but by their ability to obtain and keep goods. In this manner, potential revenue can be seen primarily as a product of the participant’s ability to loot, steal, scavenge and claim recognition from peers.

Private penalty is the first of the two variables to be dependent on n . The probability of facing a penalty is decreasing in n , since the likelihood of any one person being pursued by law enforcement or other protective forces lowers as the

group grows. This in a sense gives participants an ability to hide within the numbers (Lachman, 1996). Additionally, as the group size increases it becomes more difficult for the police or other protective forces to effectively stop or penalize the group as a whole. One reason for this is that the cost of persecution becomes significantly higher as the magnitude of the group becomes too great. The probability of encountering law enforcement could be captured by taking the number of law officers divided by the population of the riot. However, since not every encounter with law enforcement would result in a penalty being given, this number would only give a conceptual idea of the probability. The consequences of the cost of prosecution and the limited budget of law enforcement are later discussed in greater detail in the Discussion portion of this work.

The potential for injury is independent of n and remains constant. This is due to the fact that individuals have the same potential for injury if only a few are rioting or if there is a large group. It should be marked that the possibility of injury could theoretically decrease as the number of rioters increase, once again due to a participant's ability to hide within the numbers. However, the probability has an equal chance of potentially increasing as the chance for encountering hazardous activities rises. Such harmful instances could include being trapped in a fire or panic run. For these reasons, it appears most appropriate for this variable to remain constant.

The emotional benefit gained from participation is dependent on n . Emotional benefit is increasing in n due to the increased acceptance and encouragement by the group for displaying favorable emotions toward the event. This in turn increases the quantity and degree of emotional outbursts, which then provide the participant with a psychological 'release,' sense of gratification and rush from emotional excitement (Conteh-Morgan, 2004) (Lachman, 1996). Emotional benefit is furthermore increasing in n due to the pleasure and fun a participant may find in the act itself. As in the case of the 2011 London Riots, it was pointed out in a number of firsthand accounts that many participants may have seen the riots as a reprieve from boredom. This was due to several of the summer activities such as swimming areas and youth programs, which many had taken advantage of in previous years, no longer being available due to nation-wide budget cuts (R.C. & V.P., 2011).

Finally, the variable for personal cost of time and effort is independent of n . As a personal choice, it is most likely to be independent of the number of rioters. It is assumed that once the initial decision to participate is made, that personal cost is only dependent on the how much each participant is willing to invest in the moment.

Now that the variables within the model have been expanded upon, attention can be directed to how the model can be utilized to identify if a prospective rioter will agree or decline to participate. An individual is motivated to become a rioter if and only if the benefits of participation are strictly greater than the costs of participation. If the individual's costs and benefits are equal, they will be indifferent to participation. This work assumes that this indifference will lead to individuals continuing in their current state of non-riotous activity, with an outcome of refraining from participation. Therefore, a person will choose to become a rioter if,

$$E(n) + R_i > C + I_i + P_i(n) \quad (3)$$

$$E'(n) > 0, \quad P_i'(n) < 0$$

As previously mentioned, emotional benefits are increasing in n , while the potential for private penalty is decreasing in n . The result is that the net gain of participation increases as the number of current participants increases. This in turn supports Granovetter (1978), demonstrating how an increase in n increases the probability that another potential participant will join.

Each potential participant's benefits will become greater than their costs for participation at a certain point that corresponds to a specific number of participants. This specific number of participants must be satisfied in order to sufficiently lower costs and raise benefits (Granovetter, 1978). The number of participants required is represented by n^* . As seen in Figure 1, at n^* the emotional benefit gained from participation less private penalty is greater than the constant variables of individual cost and potential injury minus private revenue and therefore the potential rioter will wish to join.

Thus far, the elaboration above has imparted how an individual assesses the costs, benefits and ultimately the net gain of participation. It is recognized that this action is influenced by the number of active participants at the time of decision.

However, further exploration is needed in order to fully understand how the action of one affects another and amounts to the collective product. It is here that this study turns to game theory for additional evidentiary support.

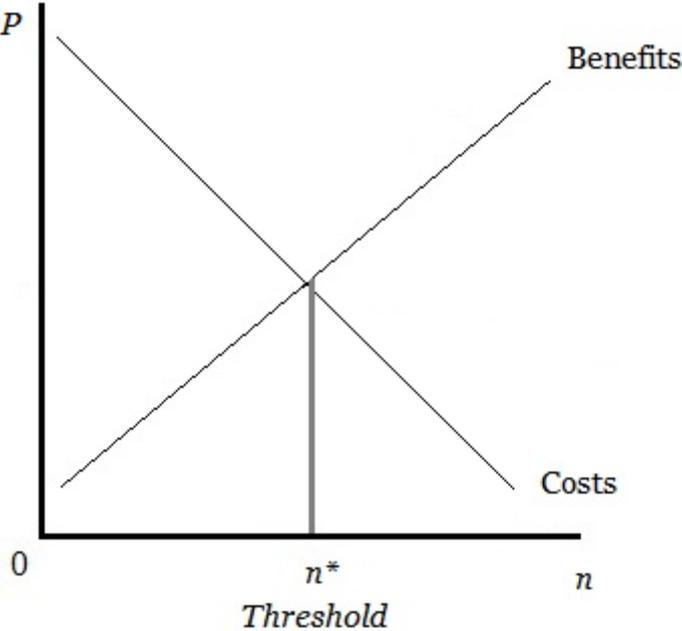


Fig. 1. An individual’s cost and benefits of participation in terms of the number of expected rioters

2.4 THE RIOT THRESHOLD MODEL AS A COORDINATION GAME

A coordination problem is a situation where an individual endeavors to make a rational choice while facing an uncertain outcome due to the various possible strategies the other player or players can select depending on the structure of the game. In this problem, multiple individuals have the potential of realizing gains but only when the decision of each player is consistent with that of every other player. The coordination puzzle therefore has multiple equilibria. A well-known example of a coordination puzzle, and one that can be used to exhibit a simplified riot, is the Battle of the Sexes game. As shown in Gintis (2009), this game has two players, a husband and wife. The husband would prefer to go gambling, while the wife would prefer to attend the opera. However both would prefer to go to one event together rather than to go to either event separately. The game therefore has two pure-strategy equilibria, were both go gambling or both go to the opera, and one mixed-strategy equilibrium, were the couple do both activities but only for a portion of the time. The payoffs of pure-strategy equilibria are greater than the payoffs of the mixed-strategy. Therefore,

each person has an incentive to choose the outcome that the other is also committing to, with no desire to deviate.

A riot can then be viewed as a simplified coordination game similar to the Battle of the Sexes game. In the case of a riot, as the number of individuals who are rioting increases, the costs will decrease and in turn the benefits of being a part of the riot increase (Granovetter, 1978). One person may have more to gain than another from a riot or a non-riot outcome, but both will benefit from coordinating their actions. Therefore, each participant is better off and has an incentive to pursue a pure-strategy equilibria. The study of crowd behavior as a game in Berk (1974) likewise supports this conclusion.

A game that includes the entire population of rioters, represented by N , requires each rioter to be identical in that they hold a specific number of participants which must be satisfied before they will choose to participate. This specific number is represented by n^* and is strictly greater than 1. In a riot game, the two pure-strategy equilibria are as follows: If every other player is rioting, it is optimal to riot. If every other player is not rioting, it is optimal to not riot. The equilibrium that is ultimately achieved depends on the preferences of the players. As seen in the previous section, these preferences can be expressed in terms of n^* . If n^* is less than the current population of the riot N , then there is no riot. If n^* is greater than the current population N , then there is a full riot.

One way of demonstrating a riot as a coordination game is with a payoff matrix, as shown below in Matrix 1. The following payoff matrix is an example of the choices that two potential rioters face. In each cell, the first number represents the payoff to Player 1, a potential rioter, and the second number represents the payoff to Player 2. R symbolizes the choice to riot, while No symbolizes the choice to not riot. As seen in Matrix 1, if both players choose the same action, they will have positive payoffs. Therefore, in a one-shot game, each potential participant will prefer to riot only if the other person is rioting, and will prefer to decline to riot if the other does so as well.

Matrix. 1.

		Player 1	
		R	No
Player 2	R	1, 1	0, 0
	No	0, 0	1, 1

$$\text{No Riot: } N = I - 1, N < n^*(i) \text{ for all } i \tag{4}$$

$$\text{Full Riot: } N = 0, N > n^*(i) \text{ for all } i$$

The payoffs that appear in Matrix 1 are symmetrical in order to present the most simplistic example of the game. However it is highly plausible for one pure-strategy equilibrium to carry higher or lower payoffs than the other. What then, makes the players coordinate and achieve one equilibrium? This question requires more than simply looking at the payoffs of the possible equilibria. The two pure-strategy equilibria are beneficial for demonstrating the extremes of a riot, but cannot address the progression of the event. Since the majority of riots typically exist at a number of participants that falls between full riot and no riot, further explanation is needed.

According to Granovetter & Soong (1986), the missing link can be found in the time between these two equilibria. Therefore, the coordination efforts become about the decisions that occur during the progression of the riot from the point of zero participants to all. A plausible enrichment to the explanation of how riots begin and evolve is found in the threshold model, and specifically Granovetter's Threshold Model (1978). This model addresses the time between full and no riot by treating the game as sequential rather than simultaneous. Granovetter argues that the threshold model is an improvement over game theory models since it is able to "take the two

elements of collective behavior which game theory handles only with difficulty and makes them central: substantial heterogeneity of preferences and interdependence of decisions over time” (Granovetter, 1978, p. 1435). In other words, the model allows for the behavior of participants to be evaluated as serial rather than parallel choices. Serial choices then permits a scenario in which each potential participant observes their surroundings in order to assess how many individuals are participating. Furthermore, the evaluation is seen as repeated at each stage of the riot. This in turn opens a riot to be evaluated as a continuous accumulation of individuals (Macy, 1991) (Granovetter, 1978) (Granovetter & Soong, 1986) (Rolfe, 2004).

Granovetter is, in a sense, in harmony with game theory in that it holds many of the same concepts, such as the idea that individuals coordinate. However it is also a continuation in that it addresses the sequential limitation of game theory. Granovetter’s Threshold Model is also a helpful addition as it is backward thinking, while game models are forward thinking. It is for these reasons that this study now turns to Granovetter’s Threshold Model in order to further develop the Riot Threshold Model.

2.5 GRANOVETTER’S THRESHOLD MODEL AND THE RIOT THRESHOLD MODEL

Up to this point in the development of this model, the private interest equation for participation and the simultaneous game model have been utilized for describing the rationale behind the choice to partake in a riot. The development of the cost-benefit analysis and the coordination game are an “advance over crude psychologizing about crowds' stripping away the "veneer" of civilization from their participants,” which has previously been common throughout theories of crowd and collective action (Granovetter, 1978, p. 1421). However, even after the choice to coordinate in a full riot is explained as rational, the question still remains of how the riot is initiated and coordinates to one equilibrium. Why do some individuals act first, helping to ignite what would later evolve into a full riot? It is for this reason that it can be said that knowing simultaneous game outcomes as well as “the norms, preferences, motives, and beliefs of participants in collective behavior can, in most cases, only provide a necessary but not a sufficient condition for the explanation of

outcomes” (Granovetter, 1978, p. 1421). In order to find the sufficient condition, this study turns to Granovetter’s Threshold Model (1978).

The threshold model is valuable in explaining collective action as it has the ability to “take the ‘strangeness’ often associated with collective behavior out of the heads of actors and put it into the dynamics of situations” by assessing the situation as the result of an accumulation of choices within a crowd (Granovetter, 1978, p. 1442). Therefore, this study supports Granovetter in the belief that in order to provide a full and sufficient explanation for how a riot begins, as well as develops, “one needs a model of how these individual preferences interact and aggregate” through a series of sequential acts (Granovetter, 1978, p. 1421).

By utilizing Granovetter’s model, the outcomes of group behavior can be scrutinized in light of the entire population of rioters, uniting individual behavior and collective action. Once the original actions are explained, a threshold model can be used in order to share how the riot continues to evolve. Granovetter’s Threshold Model, as termed by Macy (1991), also called the ‘Riot Model’ by Watts (2011), and simultaneous game theory models share the assumption that all individuals are rational utility maximizers and possess complete information (Macy, 1991). The model is intended for cases where an individual is facing a binary decision where they are presented with two distinct and mutually exclusive alternatives (Granovetter, 1978) (Watts, 2011). Moreover, the cost and benefits of a decision for each individual is dependent in part on how many other individuals in the group chose the same alternative, making it a conditional decision model (Granovetter & Soong, 1986) (Rolfe, 2004). It is for this reason that Granovetter’s Threshold Model is an appropriate application for a riot, and that this study evaluates these first individual’s actions in terms of a threshold model.

The threshold requirement is the foundation of the threshold model for collective behavior (Granovetter, 1978) (Granovetter & Soong, 1986) (Watts, 2011) (Macy, 1991). According to Granovetter, each potential rioter possesses a numerical ‘threshold’ that must be satisfied in order for them to join. This numerical threshold is defined as the number of individuals who must make the same decision before one follows the same action. Potential participants’ expectations are adaptive and are evaluated at each stage of the riot as it develops. Once the riot has begun, each stage

of the riot is associated with a specific number of current participants which begins at one and continues sequentially. When a one additional individual joins, a new stage has begun and a new evaluation takes place. The threshold does not need to be satisfied at any particular stage of the riot in order to motivate participation. It simply needs to be satisfied at any stage of the riot and then be maintained. In other words, the threshold is the lower limit equivalent to the number of people who must be currently participating in the riot for the potential rioter to consider joining. The threshold requirement is also related to the previously defined n^* , since it is also “the point where net benefits begin to exceed net costs for that particular actor” (Granovetter, 1978, p. 1420).

Every individual has a numerical threshold of social influence where they will find themselves tipping from serenity to violence (Watts, 2011). Some individuals, such as “rabble rousers” or organized criminals, possess very low thresholds, while others, such as a diligent citizen or local politicians, have very high thresholds (Watts, 2011, Kindle Loc. 1086) (R.C. & V.P., 2011). The higher the threshold requirement, the more time and stages that are necessary for it to be satisfied. One factor that has the ability accelerate the growth of a riot is an increased speed or greater ease of access to information about the growing number of participants.

The threshold model that is utilized for this study is a departure from Granovetter’s Threshold Model in that it considers n to be the absolute number of current riot participants in the evaluator’s immediate surroundings and not a proportion. For clarification, the immediate surroundings are defined as the area in an individual’s environment that they can view or hear. In other words, it is the area that a person can perceive firsthand at the moment of evaluation. The definition for a threshold requirement, as utilized in the Riot Threshold Model, most resembles Watts’s simplified description of Granovetter’s model. Watts describes how a riot comes to be among a crowd of a hundred: where “exactly one person...has a threshold of zero, while another has a threshold of one other person, another has a threshold of two other people, and so on all the way up to the most conservative person, who will join in only after all ninety-nine others have” (Watts, 2011, Kindle Loc. 1093-94).

Granovetter (1978), in contrast, defines the threshold requirement by establishing the threshold x , the frequency distribution, the cumulative distribution

function and the proportion of the population who have joined a riot by time t using discrete time periods. The cumulative distribution function then represents the proportion of the population having a threshold requirement less than or equal to x . This difference in definition may seem somewhat obvious or insignificant, but it has an important effect on the outcome. The reason for this change is that individuals under stress make decisions based on predominately intuitive processes, such as dividing the crowd immediately before them into groups of agitators and non-agitators and then counting the group. They are less likely to use advanced computations, such as calculating the percentage of agitators among the population (Kahneman 2011) (Kahneman & Fredrick, 2005) (Hammond, 2000). The transition from considering a percentage to using an absolute number in the immediate surroundings is therefore held to be in greater accordance with research findings, as seen in Kahneman (2011) and Kahneman & Fredrick (2005). The use of an absolute number is likewise reinforced by firsthand accounts, as seen in Morrell et al (2011) as well as Quinn and Adams (2011).

In this model an individual will count themselves as the first n in their evaluation, since their choice to participate would result in $1+n$. Accordingly the first individual to consider rioting does not have a threshold requirement of zero, but of one. This is another small yet important change from Granovetter's model (1978). There is an assumed heterogeneity in the population of rioters. The threshold requirement for participation is represented by $n^*(i)$ and can be shown as the following,

$$n^*(i) \text{ as defined as the lowest } n \text{ such that} \tag{5}$$

$$E_i(n^*) - P_i(n^*) > C + I - R_i$$

These individual thresholds requirements can then be ranked within the population according to their i , where,

$$n^*(1) < n^*(2) < n^*(3) \dots < n^*(i) \tag{6}$$

One note is needed concerning the application of threshold requirements to collective behavior. Caution should be exhibited when applying and ranking thresholds in an experiment or empirical study due to a minimum of two note-worthy

errors that can occur, which Granovetter (1978) himself highlighted. These errors include: (1) “Thresholds may be only imperfectly measured by one’s position in the time sequence of adoption; measurement error, imperfect information, and chance personal events unrelated to the innovation may result in this” inaccuracy in calculating an individual’s threshold requirement (p. 1440). Coupled with (2) “Where the R^2 of multiple regressions falls much under 1.0, the predicted threshold distributions may vary significantly from the true ones” (p. 1440). However, populations “whose distributions have highly stable equilibria might nevertheless yield good predictions from this procedure” (p. 1440). In sum, the ranking of thresholds poses an empirical challenge to researchers since Granovetter’s model is backward looking and thresholds are established after the fact.

If the threshold requirement of each individual within the population is satisfied, then a riot will occur. In other words, if:

$$n^*(i) < i - 1 \quad \text{for all } i \quad (7)$$

then each individual’s threshold requirement is satisfied and each member will chose to join the riot. This results in a group coordinating to full riot equilibrium.

The purpose of including the threshold model in the Riot Threshold Model is to provide a sufficient condition for action. This model focuses on the decision-making process that each separate individual conducts when evaluating their options. An individual sees if their threshold requirement is satisfied and then evaluates if their net benefits outweigh their net costs. In this manner, Granovetter’s Threshold Model expresses how a riot is initiated and then evolves.

From rational choice theory, we would expect the individuals who choose to riot to always hold the preference to riot. Furthermore, the only reason they do not riot each day is because they require coordination to do so. This advocates that rioters do not regret their decision to participate in the long-run and accept the costs of public destruction. One possible reason this may not be the case is that a potential participant experiences a sufficient level of stress which would alter their cost and benefit analysis, allowing the individual to later regret their actions. Therefore it can be said that after it is expressed how a riot could be evaluated as well as how the riot develops, there remains the final inquiry of how the choice to join the riot could be

deemed as rational when all long-run costs and benefits are taken into account, since evaluators are assumed to possess perfect information. A riddle that can be solved by introducing the differences between intuitive and deliberate thinking and hence the dual processes of thought. It is here we discuss the preferences of action versus the coordinating mechanisms and expectations that are essential to the Riot Threshold Model.

2.6 DUAL-PROCESSING MODEL AND THE RIOT THRESHOLD MODEL

The dual-processing model comes from “the ancient idea that cognitive processes can be partitioned into two main families traditionally called intuition and reason” (Kahneman & Frederick, 2005, p. 267).” A number of dual-processing models have been explored and implemented throughout economic, psychology and neuroscience studies (Sanfey et al, 2006, p. 114) (Camerer et al, 2005) (Evans, 2008; 2007; 2006). These models have their foundations in empirical research. As in Tversky and Kahneman (1983), subjects consistently made a basic logical fallacy, the conjunction error. The authors concluded in this study that “the conjunction error demonstrates with exceptional clarity the contrast between the extensional logic that underlies most formal conceptions of probability and the natural assessments that govern many judgments and beliefs” (Tversky & Kahneman, 1983, p. 43). In other words, error highlights the existence of deliberate as well as intuitive reasoning. This certainty of the existence of simultaneous dual-processing is echoed throughout a variety of other works. It should be noted that there is currently research being conducted to investigate if there are in fact more than two processes, but the existence of at least two remains a certainty (Stanovich, 2009).

Two dual-processing models which have been particularly instrumental to this study are Thaler and Shefrin’s Planner-Doer Model (1981) and Kahneman and Frederick’s Dual-Processing Model (2005). It was Thaler and Shefrin’s Model which guided this study towards the idea that a dual process model could present the key to explaining a rioter’s actions (Thaler & Shefrin, 1981). The Planner-Doer Model verifies how “the idea of self-control is paradoxical unless it is assumed that the psyche contains more than one energy system, and that these energy systems have some degree of independence from each other” (Thaler & Shefrin, 1981, p. 393-94). Their model reveals how an individual “at any point in time” possesses a planner and

a doer. It underlines how “the planner is concerned with lifetime utility, while the doer exists only for one period and is completely selfish, or myopic” (Thaler & Shefrin, 1981, p. 394). These connections are vital for solving the mystery of why potential participants engage in behavior that may seem immediately gratifying and utility seeking, when the aftermath is taxing in the long-run not only to themselves but their communities as well. This in turn provides the first indication that a rioter does not lack perfect information but an inability to consider all the information available to them. It also introduces a way for a rioter to be rational and yet capable of not fully understanding or even regretting their choice to participate in the long-run.

Thaler and Shefrin’s Planner-Doer Model requires additional information if it is to demonstrate how the separation between planner and doer occurs. A requirement filled by the Dual-Processing Model of Kahneman and Frederick (2005). The dual-processing model can be linked to the planner and doer in Thaler and Shefrin’s model by connecting the planner with system 2 processing and the doer with system 1 processing. This is supportable by the sufficient similarities between the reasoning planner and instinctual doer to the intuitive system 1 and the deliberate system 2.

This study follows the terminology of “system 1” and “system 2” from Stanovich and West (2002), Kahneman and Frederick (2005) and others, as seen in Evans (2008). It should be taken into account, as it is in Kahneman and Frederick (2005), that the term “system” is simply used as “a label for collections of cognitive processes that can be distinguished by their speed, their controllability, and the contents on which they operate” (p. 267). As described by the psychologists Overton and Ricco (2010), the dual processes consist of the procedural system 1 and the competent system 2. System 1 is highly dependent on a decision’s context, which comes from “both the competence system and informational inputs” (Overton & Ricco, 2010, p. 233). It utilizes procedure as a means to an end or goal and is generally efficient, relatively automatic, fast and preconscious. System 2 is generally characterized as a “normative, abstract, idealized, dynamic model of the operations of the mind” which is “relatively enduring, universal, and applicable to a broad range of phenomena” (p. 232). This system is flexible, effortful, slow, and considered to be “the relatively conscious nature of competence processing” (p. 232). In action, system

1 quickly produces intuitive answers to questions and problems as they arise. System 2 then screens the quality of these proposals, which it may “endorse, correct, or override” (Kahneman & Frederick, 2005, p. 268) In other words, system 2 is present “to overcome the impulses of system 1,” giving it charge over self-control (Kahneman, 2011, Kindle Loc. 469-70).

Kahneman (2003) outlines how the preferences of System 1 and System 2 are not always in line. Kahneman demonstrates how this is due to the fact that the “preferences that are controlled by the emotion of the moment” cannot be expected to be “internally coherent, or even reasonable by the cooler criteria of reflective reasoning” (2003, p. 1463). Therefore, an important aspect of the dual-processing model is that it demonstrates how one individual can simultaneously have two sets of preferences for one situation. The ultimate decision of the individual then becomes dependent on whether their decision-making process is currently dominated by system 1 or system 2 processing. One reason for a decision-making process to be dominated by one system versus the other is the presence of a sufficient level of stress. It is the supportable assumption of this study that a riot poses a sufficiently stressful environment which then in turn alters cognitive abilities. This is further discussed in Claim 1 of the following section, The Model Meets the Riot. It is moreover possible to introduce that a riot is capable of lowering cognitive abilities to a level where the decision-making process of a potential rioter becomes dominated by system 1 processing.

Now that the pivotal role of dual-processing in the decision-making process has been introduced, this work wishes to exhibit one way for the dual-processing model to be incorporated in the cost benefit-analysis of the rational potential rioter. This is done with the intention of explaining why many participants hold a preference to participate in the short-run, which they then later regretted in the long-run. This change in preferences can be found in multiple stories of regret and remorse among the firsthand accounts of the participants of the 2011 London Riots (R.C. & V.P., 2011; 2012).

The variables in the private interest equation of the Riot Threshold Model can be divided into two groups of variables. These groups are based on how an individual assesses the different variables within the equation. Some variables are assessed with

intuitive processing while others demand more deliberate processing for accurate assessment. The variables that can be weighed by intuitive processing are defined as system 1 variables while the variables assessed by deliberate processing are defined as system 2 variables. Elements that are beneficial to an individual are assessed intuitively, while costs require deliberate assessment (Kahneman, 2003; 2011). The variables of the private interest equation can therefore be divided and defined in the following manner:

Define:

$$\text{SYSTEM 1 as, } E + R_i \tag{8}$$

$$\text{SYSTEM 2 as, } P_i + C + I_i$$

The beneficial variables designated to system 1 are defined as such because they stem from processes that are completed “automatically and quickly, with little or no effort and no sense of voluntary control” (Kahneman, 2011, Kindle Loc. 358-59). The cost variables in system 2 are defined as such because they are “associated with the subjective experience of agency, choice, and concentration” as well as “effortful mental activities,” “including complex computations” (Kahneman, 2011, Kindle Loc. 360-61). It is important to note that the dual-processing model disregards that E and P_i are dependent on n .

Now that the variables have been separated and defined as system 1 and system 2 variables, the Model can devise how an individual’s cost-benefit analysis depends on whether an individual is operating in system 1 or system 2 dominated processing. The case that this study is most concerned with is when a decision is dominated by system 1 processing. System 1 dominated processing can be shown as occurring when:

$$E + R_i > P_i + C + I_i \tag{9}$$

Demonstrating that when a decision is dominated by system 1 processing, that the variables attributed to system 1 are greater than the variables of system 2.

In order to represent the effect of a shift from a system 1 dominated process to a system 2, the two groups of variables are each given a weight. These weights are

strictly positive and the sum of the two weights represents the full abilities of the individual's cognitive processing. Each weight is to mirror the proportion of an individual's full processing abilities that is being utilized by that system. For example, if the brain is primarily processing intuitive information, system 1 processing would dominate. In this case, the weight of system 1 would be expected to be greater than the system 2 weight.

The weight placed on system 1 is represented by ω and the system 2 weight is represented by φ . As noted above, the full processing capabilities of an individual is represented by $\omega + \varphi = 1$. While $\frac{\omega}{\varphi}$ is a function increasing in n that represents a sufficient level of stress. The weights of system 1 and system 2 in private interest equation can therefore be represented by the following:

$$G_r = \omega(E + R_i) - \varphi(P_i + C + I_i) \quad (10)$$

At this juncture, the current expected number of participants is not included in the equation in order to highlight the value of the weights to the potential rioter's analysis. If the individual's choice to riot is to be defined as a rational decision, the weighted private interest equation for participation must be strictly positive,

$$\omega(E + R_i) - \varphi(P_i + C + I_i) > 0, \frac{1}{\varphi} \quad (11)$$

$$\frac{\omega}{\varphi}(E + R_i) - (P_i + C + I) > 0 \quad (12)$$

The goal of a utility maximizer can then be simplified to one of maximizing the sum of emotional benefit and private revenue. Shown as,

$$\frac{\omega}{\varphi}(E + R_i) > (P_i + C + I) \quad (13)$$

When the threshold requirement is included it yields the following condition for participation,

$$\frac{\omega}{\varphi}(n)(E + R_i) > (P_i + C + I) \quad (14)$$

The threshold requirement can then be defined implicitly as,

$$26 \quad (15)$$

$$f(n_i^*)(E + R_i) = P_i + C + I$$

The inclusion of separate weights of system 1 and 2 allows for the evaluation of system 2 costs, such as destroyed buildings, the loss of infrastructure and a lack of psychological stability, to carry a separate weight from that of system 1 benefits. These weights illustrate how the net gain from participation in the current time period is less than the net gain from participation in the time period immediately after the riot when processing is dominated by system 1. In sum, this provides a possible explanation for a difference in a rioter's preferences in the short-run and the long-run, while holding that the individual is acting rational at the time of decision.

2.7 THE ROLE OF STRESS IN THE RIOT THRESHOLD MODEL

A study of firsthand accounts from the 2011 London Riots as well as psychological and neurological studies suggests that a leading cause for the dominance of system 1 processing in a potential rioter's decision-making process is the presence a sufficient level of stress in the individual's environment. The results of this study are explored below. The shift from system 2 to system 1 dominated processing is in part due to the ability of a sufficient level of stress to reduce and bind cognitive abilities to system 1. This shift can be reflected in the weighted private interest equation seen in the previous section. It can be said that when an individual experiences a sufficient level of stress that the weight of system 2 processing, φ , decreases as the weight of system 1 processing ω increases. Each weight is continuous and becomes a function of the level of stress that the individual experiences. It should be noted that whether it is possible for φ to equal 0 is for another study.

Due to limited system 2 processing, a sufficient level of stress alters the potential participants' evaluation of costs and benefit. The outcome is that the net gain of participation appears greater in the short-run than in the long-run. Benefits such as private revenue and emotional benefit are instantly obtainable and become of crucial importance in the moment. However costs such as potential penalties, injury and personal cost are typically perceived with limited awareness. This in turn imparts a short-sidedness in the individual's decision-making process and cost-benefit analysis for participation. Furthermore, participants are likely to regret or not fully understand their actions in the post-riot period after the costs are fully realized.

It is important to note that a number of factors outside of a sufficient level of stress can cause the shift from system 2 to system 1 dominated processing. Stressors in an individual's environment are highlighted in this study as the source of this restriction because they are deemed to be the leading and most influential source of the shift in the case of riots. However, additional causes may exist and be of noteworthy importance. The primary concern of this work is that a shift is possible, and therefore that the decision-making process has the capacity to be limited to the intuitive system 1 by some source. The limitation to the decision-making process and hence the short-sidedness of the cost-benefit analysis is what is essential to the Riot Threshold Model. It is assumed that any factor which affects the balance between intuitive and deliberate processing would produce a similar effect on the private interest equation and support the model. The discovery of the origins of the root cause can therefore be seen as a secondary concern, as it is not indispensable to the model. However, the crediting of the role of stress in the decision-making process is undertaken in this study because of its contribution to understanding of a riot.

The firsthand accounts of participants from the 2011 London Riots, such as those provided by the government sponsored Riot Communities & Victims Panel report (2011), reflect that stress leads to limited cognition. However, this fact also finds support in the basic composition of the brain itself (Hammond, 2000) (LeDoux, 1996). Studies have established a physical connection between the rise of emotions in individuals, as seen in the rioters of London, and their ability to make decisions. A study quoted by Hammond and done by the neuroscientists Lazarus and Lazarus (1994) found "that emotion and reason are interdependent" and that it is when an individual experiences an emotion that the mind fixates its attention on coping with the task or emergency at hand, which in turn limits the individual's view of the long-run (Lazarus and Lazarus, 1994, p. 179 as quoted by Hammond, 2000, p. 23). Kahneman is united with these findings and underlines that "intense focusing on a task can make people effectively blind, even to stimuli that normally attract attention...we become not only "blind to the obvious," but also "blind to our blindness" (2011, Kindle Loc. 418, 428).

Once an individual's cognitive functions become "overloaded" as stressors continue to grow and multiply, the individual's processing speed lowers (Thompson,

2010). The brain's ability to retrieve information becomes increasingly difficult and slower until the accuracy of the information being retrieved becomes questionable. At this point, "thinking itself becomes a chore; and it becomes difficult to maintain focus, clarity, and the motivation to continue" (Thompson, 2010, Kindle Loc. 2653-55). As the stress level surges, a "notable decline" occurs in the individual's ability "to process complex information and handle ambiguity" (Thompson, 2010, Kindle Loc. 2663-64). The individual's cognitive intelligence then "tends to take on a more concrete and short-term perspective" (Kindle Loc. 2665-68). The individual's long-term planning capabilities are "lost with increased stress." Furthermore, as the level of stress increases from low to moderate to sufficiently high, "time horizons continue to become shorter" until the individual is only functioning in and focusing on the "now" (Kindle Loc. 2665-2668). In other words, "the balanced blend of cognitive and emotional intelligences begins to shift toward decisions that are emotionally driven" (Kindle Loc. 2715-16).

Outside the framework of stress, the intuitive system 1 "has the ability to transmit signals almost four times as fast" as system 2 (Thompson, 2010, Kindle Loc. 2718-27). Without the control and intervention of the deliberate system 2, "the emotion center can operate at full speed" and "the emotion center begins to operate on automatic pilot" (Kindle Loc. 2718-27). Intuitive decisions are left uncontested and "previous decisions and data that have been emotionally tagged or primed" now appear to be the best alternative (Kindle Loc. 2718-27). As "everything becomes short term, with little consideration for unintended consequences," there is an increasing probability of the individual making a less effective decision compared to when system 2 is fully active" (Kindle Loc. 2718-27).

The importance of the role of stress is supported by further psychological and neurological studies. A number of studies demonstrate how an individual's use of more demanding cognitive processing is severely limited under the sway of stress (Slovic et al, 1974) (Hammond, 2000) (Maule & Hockey, 1993). Evidence from multiple previous studies indicate that situations which carry high levels of stress or "high levels of emotional intensity block access to short-term memory, disorganize logical or inferential thought processes, cause loss of control of body parts and functions," which in turn create physical manifestations of stress such as trembling

hands, nausea or headaches (Kaufman, 1999, p. 139). Perhaps most importantly, situations of great intensity have the ability to “block out rational considerations of benefit and cost, and promote acts of aggression and violence” (Levitt, 1980; Idzikowski and Baddeley, 1983; Lane, 1991; Lazarus, 1991; Oatley, 1992 as cited by Kaufman, 1999, p. 139).

A selective review of development research studying children’s performance in judgment and decision tasks by Haines and Moore (2003) found that more sophisticated reasoning, such as system 2 processing, is more likely to occur in situations of “social and interpersonal domains” (p. 227). These situations are typically of high personal relevance where task difficulty is low, the individual is highly familiar with the situation and peer or cultural norms encourage the individual towards task engagement (2003). It can be said that a riot does not reflect this type of environment. A riot does however reflect a situation where “less complex, script-based processing,” such as system 1, is dominate. Haines and Moore (2003) illustrates how the entire population, including the very young is effected by dual-processing. Giving explanation to the age span of participants in the 2011 London Riots, since the youngest person to be arrested was only ten years old at the time (R.C. & V.P., 2011).

In sum, this survey of psychological and neurological studies supports the theory that when an individual is under stress, their decision-making process is dominated by system 1 due to the restriction of system 2 processing. Furthermore, when there is an absence of stress or other limitations the individual has the capability of utilizing both system 1 and system 2 processing (Hammond, 2000) (Slovic et al, 1974) (Toates, 1995).

The importance of the role of stress on the decision-making process suggests that a potential participant’s cost-benefit analysis is significantly swayed by the stressors produced by the riot. As seen throughout the survey, when a sufficient level of stress is present the brain is captivated by system 1, intuitive thinking. While an insufficient level of stress allows the system 2 processing to fully operate, which in turn allows system 2 to dominate. The time periods before, during and after the riot can therefore be seen as periods corresponding to insufficient or sufficient levels of stress and thus system 1 or system 2 dominance. The period before and up to the

moment the riot begins has increasing but insufficient levels of stress. The period during the riot begins with increasingly sufficient levels of stress, which then turns to decreasingly sufficient levels as the riot decreases in magnitude. The period after and at the moment the riot ceases continues with decreasing but insufficient levels of stress. These periods in turn correspond to system 1 and system 2 processing. It is therefore useful to view the lifespan of a riot in terms of the level of stress it produces over time. This is illustrated in Figure 2.

The dominance of system 1 processing under a sufficient level of stress during a riot causes the potential participant to focus primarily on short-run costs and benefits and discount long-run costs such as damages to infrastructure or future tax increases exacted in order to pay for repairs. In other words, as the level of stress an individual experiences increases, the costs of participation will decrease. For clarity, the term ‘short-run’ is used and defined as the moment that an event can be seen as a riot by a potential participant and all moments thereafter were the riot exists. In other words, the short-run includes all moments where the current level of stress affecting the evaluator is greater than or equal to the sufficient level of stress. Similarly, the term ‘long-run’ is defined as the moment that and all moments thereafter that the riot ceases to exist and the sufficient level of stress no longer affects the individual.

The connection between system 1 processing and a focus on the short-run as well as between system 2 processing and a focus on the long-run then suggests the following:

$$\text{Short – run} \Leftrightarrow \text{Riot State} \stackrel{\text{def}}{=} n \geq n^* \Leftrightarrow \text{Sufficient Stress} \stackrel{\text{def}}{=} \omega \geq \omega^* \quad (16)$$

$$\text{Long – run} \Leftrightarrow \text{Post – riot State} \stackrel{\text{def}}{=} n < n^* \Leftrightarrow \text{Insufficient Stress} \stackrel{\text{def}}{=} \omega < \omega^*$$

The current level of stress is represented by the system 1 weight, ω . The sufficient level of stress caused by a riot is then represented by ω^* . The level of stress produced by the environment is continuous, increasing as the riot grows and then decreasing as it dissolves.

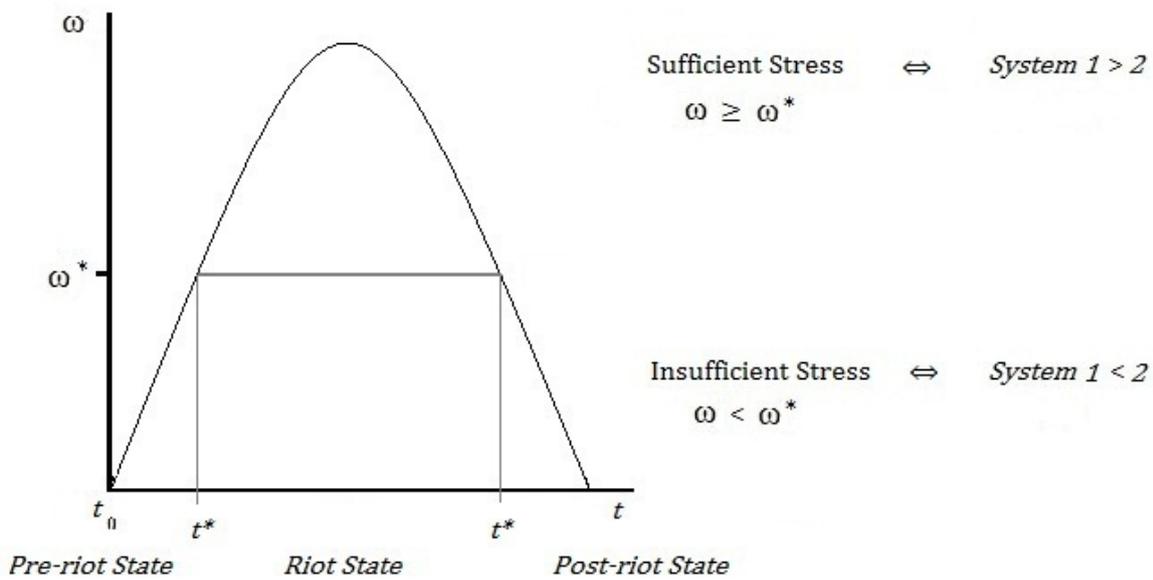


Figure. 2. The lifespan of a riot defined in terms of the level of stress it produces

The current expected number of participants must be sufficiently high for the potential participant to consider it a riot, the environment being of a riotous nature then brings about a sufficient level of stress. In this way, it can be said that the costs are decreasing in ω as well as decreasing in n . In a similar way, benefits are increasing in ω as well as increasing in n . The connection between stress and the number of participants is therefore highlighted. The premises that costs are decreasing and benefits increasing remain the same, however there are now two possible explanations for the changes in perceived costs and benefit. To a certain extent, it is not possible to discriminate between the two models for the reasoning behind an individual having a particular preference. Both promote the importance of the aggregation of individual's decisions. Since both of these explanations provide a similar result, they can be said to be two separate reasons or they can be defined as interconnected. However, it seems to be in greater accordance with firsthand accounts as well as the literature to say that both the expected number of participants and the level of stress have a joined and compounding effect on a potential rioter's analysis for participation.

The conclusion of the Riot Threshold Model is that a potential rioter will choose to engage in a riot when both their necessary and sufficient conditions are satisfied. The necessary condition being that the benefits from participation are

strictly greater than the costs. The sufficient condition is that the expected number of current participants is greater than or equal to the evaluator's threshold requirement. The costs and benefits from participation are affected by the current expected number of rioters and the individual's dual-processing system being dominated by system 1. The expected number of participants effects costs and benefits during both the short and long-run while the dominance of system 1 processing only affects perceived costs and benefits during the riot state, when a sufficient level of stress is present. The end decision for participation is motivated by a desire to optimize the individual's utility. Therefore, decision to riot can be defined as a rational choice. In this way, the "stripping of the 'veneer' of civilization" and appearance of the maddening crowd in previous collective action theories can be shown as not a maddening, but a result of a rational choice (Granovetter, 1978, p. 1421).

3 The Model Meets the Riot

The Riot Threshold Model is based on theory, however it can be supported and mirrored in the events of the 2011 London Riots. It is for this reason that a selection of stories has been chosen in order to provide poignant examples of how the model is applicable to real world events, and to the London Riots in particular.

The supporting evidence presented here has been taken from government sponsored research, news articles, a book and even a blog. These quotes are taken from the largest collection of data that was possible to gather within the time limits of this work. Every attempt has been made to present the most accurate picture of the riots as possible. However, it should be kept in mind that some of these quotes are from subjective firsthand accounts. Many are not the result of empirical studies and nearly all are quantitative in nature. It should furthermore be mentioned that these quotes are highly selective and that no individual interviews were conducted. The selectivity is due to the fact that the collection here could only be taken from the accounts made available by government, media and additional sources. Nonetheless even with these considerations in mind, the consistent echoing of the Riot Threshold Model in the firsthand accounts proved to be a strong base of support for the model's applicability and fit. In the end, the number of accounts gathered as well as the degree of correlation between the model and the accounts prove sufficient to address concerns of a selection bias.

This section of the study is organized in the form of presenting a claim derived from the Riot Threshold Model, which is then followed by support for that claim in form of a discussion followed by related quotations from the collection of accounts from the 2011 London Riots.

3.1 A RIOT AS A SUFFICIENT LEVEL OF STRESS

CLAIM: Decisions made during a riot are made under a sufficient level of stress.

SUPPORT:

In the moment that n becomes sufficiently high so that the individual performing the analysis deems the conflict to be a ‘riot,’ it can be said that the conflict is a sufficiently stressful environment and that the individual is experiencing a sufficient level of stress. A riot is a sufficiently stressful environment that can be compared with a problematic situation that “is perceived as one for which coping resources are not available” (Maule & Hockey, 1993, p. 91). According to Maule and Hockey, this atmosphere is very likely to result in “reduced effectiveness” and produces “the physiological, psychological, and behavioral symptoms of stress” (1993, p. 91). The sources of stress which stem from a riot environment are among some of the top stressors that the human body can experience. A few examples of the sources of stress that are present during a riot can be found in the following List 1.

List. 1. Sources of Stress

1. Fear of crime, confrontation or threat
2. Physical hazards such as fire
3. Perceived loss of control
4. Lack of public or private transportation, leading to a feeling of one being trapped
5. Loud noises
6. Time constraints on the decision-making process

(Toates, 2005) (Hammond, 2000)

The stressors of the riot cause physiological effects throughout the entire body of the individuals they affect (Toates, 2005). Some of the most common, as well as easily detected physical signs include increased heart rate, blood pressure, blood sugar, perspiration and respiration (Aldwin, 2009). The significance of this is that the presence of stress can be documented in a potential rioter by citing and measuring the physical manifestations of stress exhibited by the individual.

The strength of these stressors over the individual is particularly strong during a riot due to the increased frequency and scale at which they occur (Toates, 2005). Furthermore, since many of these stressors are considered uncontrollable, they are generally more distressing than those that are more likely to be under an individual's control (Aldwin, 2009). Since many of the stressors in a riot situation are seen as uncontrollable, this amplifies the stress it imparts to the individual. The power of these stressors supports Watts (2011) which states that "riots have a primal energy of their own that can undermine otherwise strong social conventions against physical destruction, even skewing our psychological estimation of risk. In a riot, even sensible people can go crazy" (Kindle Loc. 1077-78). The effects of these stressors are demonstrated in the stories below.

The strength of these effects also shows that individuals are capable of assessing the act of participation differently under the influence of stress. The difference in an individual's evaluation under sufficient stress suggests that individuals are capable of not fully understanding, or even regretting, their actions once the level of stress has decreased. This is likewise reflected in the firsthand accounts provided below.

STORY 1 [Journalist's account]: There were "scenes of people looting, vandalising, thieving, robbing, scenes of people attacking police officers and even attacking fire crews as they're trying to put out fires." (Quinn & Adams, 2011)

STORY 2 [Journalist's account]: The force of the riot and the swiftness by which it grew is reflected in law enforcement's response to the riots, "The police force found themselves completely blown away by the number and persistence of the rioters." (Quinn & Adams, 2011)

STORY 3 [Journalist's account]: There were multiple accounts of "buses [that] were stopped and abandoned." Some buses were even set on fire (Gabbatt & Adams, 2011).

STORY 4 [Personal account in Government sponsored research]: "It was literally a moment of madness. (Young person, in custody)" (Morrell et al, 2011, p. 29)

STORY 5 [Personal account in Government sponsored research]: "It was a stupid mistake. I was just acting hard." (R.C. & V.P., 2011, p. 66)

STORY 6 [Personal account in Government sponsored research]: “I just got carried away.” (R.C. & V.P., 2011, p. 66)

STORY 7 [Personal account in Government sponsored research]: “It was the heat of the moment.” (R.C. & V.P., 2011, p. 66)

STORY 8 [Personal account in Government sponsored research]: “It was like something out of a zombie movie.” (R.C. & V.P., 2011, p. 49)

STORY 9 [Personal account in Government sponsored research]: “There were large numbers of people involved, not just kids but adults too. They looked like zombies, it was just mad...Some people didn’t plan their involvement; they just got swept along with the crowd. It was shocking how it got out of hand so quickly and the police struggled to control things.” (R.C. & V.P., 2011, p. 49)

3.2 EFFECTS OF A RIOTOUS ENVIRONMENT ON PRIVATE INTEREST EQUATION

CLAIM: An individual’s evaluation of each variable within the private interest equation is affected by the riotous environment.

SUPPORT:

The following selection of stories are intended to illuminate how each variable in the Riot Threshold Model’s private interest equation was evaluated by participants and observers during the 2011 London Riots. Stories are provided for each variable in order to show how a riotous environment as well as the number of participants influences that specific variable.

3.2.1 *INCREASED VALUE OF PRIVATE REVENUE OR REWARD*

STORY 1 [Journalist’s account]: “Another youth, a young man, when asked why he was participating replied in a manner that reflected what many were doing that day, “Why are you going to miss the opportunity to get free stuff that’s worth loads of money?” Furthermore, when he was “pressed on why he was stealing stuff he could afford, he went to blame the abolition of the education maintenance grant: “It’s not about that. It’s about the government. No kids don’t want to go to college no more coz they don’t get paid.”” (Williams, 2011)

STORY 2 [Journalist's account]: "...it remains the case that these are shopping riots, characterised by their consumer choices." (Williams, 2011)

STORY 3 [Journalist's account]: As a woman in the London neighborhood of Hackney put it: "We're not all gathering together for a cause, we're running down Foot Locker." (Williams, 2011)

STORY 4 [Journalist's account]: "On Sunday morning, apparently, people had been not just looting H&M, but trying things on first. By Monday night, Debenhams in Clapham Junction was empty, and in a cheeky touch, the streets were thronging with people carrying Debenhams bags. Four hours before, I had still thought this was just a north London thing.." (Williams, 2011)

3.2.2 LOWERED EXPECTATIONS OF PRIVATE PENALTY

STORY 1 [Journalist's account]: "The government aren't in control, if they was, we wouldn't be able to do it. They tried, they failed. How many people have they arrested? 10? I'm not bothered. I'll keep doing this every day til I get caught. Asked by Ravenscroft if he was worried about being arrested, he replies: This would be my first offence. I haven't been in trouble before, I'll take a caution. The prisons are overcrowded. What are they gonna do...?" (Quinn & Adams, 2011)

STORY 2 [Personal Blog]: Written about an area where the looting had just begun: "On to the looters. A lot of them (more than half by my estimates) didn't bother to hide their faces. I don't know if this was down to bravado or stupidity, but also maybe because there were no police in sight and no media, although I suspect there is plenty of CCTV around there." (Motown's Blog, 2011)

STORY 3 [Journalist's account]: "London's police chief has admitted with hindsight he wished he had more officers on the streets at the height of last month's riots and the scale of the disorder "took us by surprise." (Sky News, 2011)

STORY 4 [Journalist's account]: "Amid the first signs of strains within the coalition over the response to the riots, government sources said the prime minister has called for an early assessment of the decision to increase police numbers in the capital from 6,000 to 16,000." (Quinn & Adams, 2011)

STORY 5 [Journalist's account]: Some individuals did not stop their looting activities even when faced with an observer who declined to riot and choose to try to interfere or reprimand the individual. These stories are a clue to the strength of the individual's view of their current environment and even to the strength of the stress that affected them. Few attempts were made to interfere or halt the illegal actions that occurred during the London Riots. The accounts recorded included verbal scoldings typically given by women. In fact, the attempts caught on tape gained considerable notoriety. The story of one such scolding was reported in the news as follows:

“When another group finished ransacking a pawnbroker's and started cleaning out a local fashion boutique, an angry young black woman berated one of them.” You're taking the piss, man. That woman hand-stitches everything, she's built that shop up from nothing. It's like stealing from your mum.” A girl holding a looted wedding dress smiled sheepishly, stuck for anything to say.” (Lewis and Harkin, 2011)

3.2.3 LOWERED PERCEPTION OF POTENTIAL INJURY

STORY 1 [Journalist's account]: “There seems to be another aspect to the impunity – that the people rioting aren't taking seriously the idea it could rebound on them.” (Williams, 2011)

3.2.4 HEIGHTENED EMOTIONAL BENEFIT

STORY 1 [Academic paper]: “For others, the riot atmosphere simply provides an opportunity to escape boredom and readily achieve adventure and thrilling experiences.” (Lachman, 1996, p. 743)

STORY 2 [Journalist's account]: “Fox said the riots seemed nihilistic, they didn't seem to be politically motivated, nor did they have any sense of community or social solidarity. This was inarguable.” (Williams, 2011)

3.2.5 LOWERED PERCEPTION OF COST OF TIME AND OTHER RESOURCES

STORY 1 [Academic paper]: A riot may present “an opportunity for acquiring personal goods (dinnerware, clothing, appliances, etc.) with minimum expenditure of resources and energy and with minimum likelihood of negative consequences” in the short-run (Lachman, 1996, p. 743).

STORY 2 [Government sponsored research]: “Many shops were subsequently looted, but in other cases, windows were simply smashed indiscriminately.” (R.C. & V.P., 2011, p. 26)

3.3 GOAL OF THE RIOT

CLAIM: Participants did not see the 2011 London Riots as means for achieving a goal.

SUPPORT:

The diversity of the people involved and the lack of objective among them are perhaps two of the more astonishing characteristics of the 2011 London Riots. Accounts are plentiful of people standing by trying to decide if they would join, defend or simply observe the acts of thievery and destruction going on around them. The lack of a central goal within these accounts is only more surprising when it is considered that one clear objective or motivation is an attribute that is nearly always associated with aggravated collective action. This lack of intention marks a separation from standard sociological theories on collective action, and more importantly takes away the possibility that the act of rioting stemmed from a sense of duty or a desire to accomplish a goal. The significance of this is that it permits the decision for participation to stay within the confines of a cost and benefit analysis that excludes concerns for the public good.

STORY 1 [Government sponsored research]: “There was no single cause of the riots and no single group was responsible.” (R.C. & V.P., 2011, p. 55)

STORY 2 [Journalist’s account]: “Take events in Chalk Farm, north London. First the streets contained people of all backgrounds sprinting off with bicycles looted from Evans Cycles. Three Asian men in their 40s, guarding a newsagent, discussed whether they should also take advantage of the apparent suspension of law. "If we go

for it now, we can get a bike," said one. "Don't do it," said another. Others were not so reticent; a white woman and a man emerged carrying a bike each. A young black teenager, aged about 14, came out smiling, carrying another bike, only for it [to] be snatched from him by an older man. They were just some of the crowd of about 100 who had gathered on the corner; a mix of the curious and angry, young and old. It was impossible to distinguish between thieves, bystanders and those who simply wanted to cause damage" ... "Most of those he was filming had covered their faces. One had a full balaclava with holes cut out only for the eyes and mouth. "Is that you, 'bruv'?" an older man, aged about 30, hands in pockets, asked the man in the balaclava. Recognising his friend, he laughed and added: "Fuck. Don't stand near me – you're going to get me arrested." (Lewis and Harkin, 2011)

STORY 3 [Report commissioned by the Cabinet Office]: "People use the cover of the crowd to do stuff that they would never have the 'bottle' to do as an individual, but when they were in that crowd they felt they had the power to do it, they had the mentality, they were willing to take a step further." - Temporary Assistant Commissioner, Chris Allison, Metropolitan Police (Challenger, Clegg & Robinson, 2009, p. 65)

3.4 COORDINATION IN THE RIOT

CLAIM: There was no extensive deliberate coordination among the participants of the riots.

SUPPORT:

In the case of the London Riots, the decision to riot seems to be free from extensive deliberate coordination or the influence of groupthink which leads to conformity and the collective denial of the reality of the destruction caused by a riot (Bénabou, 2009). Groupthink, in its most basic form, is defined as "a pattern of thought characterized by self-deception, forced manufacture of consent, and conformity to group values and ethics" (Bénabou, 2009, p. 1). The lack of influence from groupthink is further supported by empirical findings, which establish that there is little evidence that stress in the form of adversity to a group causes groupthink (Turner & Horvitz, 2001). Accounts of the riot also show that the actions

of rioters were free of extensive deliberate coordination in the sense that not all participants were acting towards a common goal or in an ordered fashion. The number of other participants currently rioting influenced potential participants' decision to join, but it did not influence how they acted after they decided to participate. In other words, the most important factor to the potential participant's analysis was not what others were doing in the riot, but only if others were active in the riot.

Most news accounts reported the appearance of a certain degree of coordination as several people appeared in the same place at the same time. However, it can be said that this is greater evidence of similar preferences for goods than of deliberate coordination. There were also a number of accounts of some coordination in regards to watching for "the Feds" and any local residents who might attempt to prevent or stop the looting of a particular shop. However, there is little to no evidence of individuals or groups extensively coordinating these efforts (Lewis and Harkin, 2011). In fact there is little evidence that individuals acted as simple groups for more than one particular looting or act of destruction. Incidents where large groups appeared and grew in one area was often due to the access to the same information by way of social or mainstream media on what areas were more vulnerable as well as similarities in preferences for certain goods. For instance, goods that were expensive or easily obtainable were targeted with higher frequency (R.C. & V.P., 2011). This is once again more likely to be due to preferences towards areas of lower risk for private penalty than the outcome of deliberate coordination. Furthermore, reports such as Halliday (2011) confirm that access to the same information through social media, and tools such as BlackBerry Messenger, increased the ease of looting but that it was not the root cause.

STORY 1 [Personal account in Government sponsored research]: "They attacked their own- we're not rich." (R.C. & V.P., 2011, p. 56)

STORY 2 [Book on the riots]: The magnitude of the events were then amplified by the Blackberry Messenger and social networking sites like Twitter, "without which the riots would still have occurred" (Bev, 2011, Kindle Loc. 39-44, 58-63).

STORY 3 [Journalist's account]: "But there was no rush; the group knew from experience that police would hold back for the time being. "Keep an eye on the Feds, man," said one youth. Overheard snippets of conversation gave an insight into how the disparate groups were deciding where to go. One man said: "Hampstead, 'bruv.' Let's go rob Hampstead." Another, looking at his BlackBerry, said: "Kilburn, it's happening in Kilburn and Holloway." A third added: "The whole country is burning, man." (Lewis and Harkin, 2011)

3.5 LONG-RUN COSTS OF THE RIOT

CLAIM: The total costs of the riots outweigh the total benefits for participants in the long-run.

SUPPORT:

As the number of participants compounded among the crowds, so did looting, arson and vandalism. These actions appeared rational in the short term, as benefits of expressing and releasing pent-up emotions and private revenue seem to outweigh the potential costs of the moment. The sense of opportunism that was felt in the air only encouraged the desire for the benefits of participation. Accounts show that it was as if everyone was asking the same question a young boy had, "Why are you going to miss the opportunity to get free stuff that's worth loads of money?" even if they could afford the items being stolen (Williams, 2011) (Lachman, 1996). However, it is when these actions are viewed in the long-run that it becomes clear that the total costs of the riots will outweigh the benefits for participants. The reason for this is that a long-run analysis would be forced to include the cost of the extensive damages and equally sizable cost of repairs. When a group destroys its own neighborhood, it is in fact destroying its own economic infrastructure and future chances for employment along with it. The reports provided after the riots confirm due to the magnitude of the total costs of the riots, that the total personal benefits gained from participation cannot compete with the total costs. Therefore in the end, a deliberate cost-benefit analysis shows that costs outweigh the benefits of rioting.

STORY 1 [Report commissioned by U.K. government]: A report conducted by the Riots Communities and Victims Panel estimated the following long-run costs for the

2011 London riots. In five days an estimated 13,000 to 15,000 participants caused an estimated 300 million pounds in damages to property, 43.5 million in clean-up costs, 80 million in lost sales and 520 million in loss in tourism (R.C. & V.P., 2011, p. 32). The same report estimated the “final bill” to be “around half a billion pounds (plus impacts on tourism)” (R.C. & V.P., 2011, p. 28).

Key costs within the half a billion pounds include the following: “up to £300m claims under the Riot (Damages) Act 1886; £30m in recovery support funding including the High Street Support scheme; more than £30m in lost sales to retail businesses; costs to police of £50m (including overtime costs); and costs to local authorities including significant clean-up costs, running into tens of millions of pounds. 330,000 tourists have been predicted to go elsewhere, cutting tourism spending by £520m over the next 12 months...In London boroughs, which experienced widespread disorder, businesses reported a 50% loss of trade for the week following the riots. By mid-September, trade was still down 20–30% and the Panel has heard from businesses across the country that trade remains down (for example, current trade in Tottenham is reported still to be 20–30% down). In some cases, this has led to businesses which existed on very low profit margins collapsing.” (R.C. & V.P., 2011, p. 28)

STORY 2 [Personal account in Government sponsored research]: “Lives were lost. Parents had to carry children out of burning homes leaving a lifetime of possessions behind to be destroyed. Shopkeepers lost everything they had built up over many years. Some were forced to sell their homes as they could no longer pay their bills.” (R.C. & V.P., 2011, p. 56)

STORY 3 [Government sponsored research]: “The extent of arson damage varied considerably. Tottenham and Croydon were particularly badly affected. In London alone, over 171 residential and 100 commercial buildings were affected by fire at a cost of millions of pounds. We heard numerous accounts of people escaping from burning premises. Several people were only saved through the intervention of their neighbours or landlords... As well as attacking firefighters trying to put out fires, some people taking part in the disturbances turned up at fire stations to prevent firefighters from going to emergency calls.” (R.C. & V.P., 2011, p. 26)

STORY 4 [Journalist's account]: "Shops and businesses around London closed early, fearing violence later." (Quinn & Adams, 2011)

4 Discussion

The following section constructs a deeper discussion on the importance of the threshold model and dual-processing models to the Riot Threshold Model. The role of each model in furthering the understanding of riotous collective behavior is articulated and fortified. The last of the discussion generates plausible adjustments to the private interest equation in the Riot Threshold Model. These potential modifications are included in order to strengthen and defend the structure of the current equation as well as to address why certain variables are not included.

4.1 IMPORTANCE OF THE MECHANISMS IN THE THRESHOLD MODEL

The inclusion of the mechanisms of Granovetter's Threshold Model in the Riot Threshold Model is essential for providing an explanation of how a riot is initiated, as well as for defining a potential participant's cost and benefits from participation. These mechanisms include the threshold requirement as well as the effect of the current population of rioters on the cost and benefits of participation.

A cost-benefit analysis can demonstrate how an individual may choose to join a riot once the riot has already begun, but it cannot explain the first 'riotous' acts. The threshold model is "valuable in helping to understand situations where outcomes do not seem intuitively consistent with the underlying individual preferences" (Granovetter, 1978, p. 1441-42). The threshold model is therefore necessary in order to show how it all begins and how a crowd coordinates towards a full riot equilibrium versus a no riot equilibrium. Once an individual's threshold requirement is satisfied, they are provided with a sufficient condition for participation. The participant will only cease riotous activity when the marginal benefit of participation does not outweigh the marginal cost. This explanation for a participant to cease their riotous activity once again demonstrates that the threshold requirement acts as a sufficient condition for rioting, while the cost-benefit analysis serves as a necessary condition.

The first individuals to take action within a crowd do so within the framework of a small group where the riot has not yet begun. It can therefore be assumed that in those initial moments that the long-run costs will not appear as high as when the

action and population of rioters escalate. It can also be assumed that these individuals experience a sufficient emotional benefit from their current actions to outweigh what is perceived as the costs of their actions. An individual who is one of no more than a handful of persons will not have the same capacity for destruction. This small number of persons would only see the costs that they themselves are capable of producing. Furthermore, in their minds it would most likely seem more improbable than probable for their actions to escalate into something that could be defined as a riot. Operating purely selfishly, the consequences of their actions will not be a current concern. To them, they are only creating a 'little' havoc and producing 'a bit' of destruction.

The Threshold Model shows how the action of this handful and their 'bit' of destruction tumbles into a full riot. As explained in the previous chapter, as these few begin, the required threshold of the next potential participant is satisfied, leading them to engage, which then satisfies the threshold of the subsequent person. This sequence continues until the riot has been born (Watts, 2011). As activity grows, each individual will look to their immediate surroundings to assess the number of current expected participants. This assessment is performed because the number of current participants affects the current costs and benefits of participation. As the riot grows in size, the potential for private penalty decreases which in turn increases the net gain. This is reflected in the Riots Communities and Victims Panel report covering the 2011 London Riot, which highlights that “the vast majority of people we spoke to believed that the sole trigger for trouble in their areas was a belief that the police could not contain the scale of rioting in Tottenham and then across London” (R.C. & V.P., 2011, p. 48). Therefore the development of a riot is dependent on this mutual contingency which is vital and produces “the chain reactions needed to get from one [non-riot] equilibrium” to a full riot equilibrium (Macy, 1991, p. 740). These results are supported by the key findings of various extensive computer simulations (Macy, 1991, p. 740).

Numerous interviews from those who set the riot into motion show that these individuals never dreamed that their actions would trigger or evolve into such widespread destruction. The surprise and remorse shown by the initial individuals is not only seen in the 2011 London Riots, but was also seen in the 1992 Los Angeles

Riots (R.C. & V.P., 2011) (Leithead, 2011). One original participant from the 1992 Los Angeles Riots is followed by regret for those actions, "sorry for what we did to this day" (Leithead, 2011).

4.2 IMPORTANCE OF DUAL-PROCESSING MODEL

The dual-processing model is a valuable aspect of the Riot Threshold Model. The long history of viewing the brain as divided between different types of processing provides a solid backbone for the inclusion of system 1 and system 2 when describing the human decision-making process (Koornstra, 2005). To reiterate, system 1 operates automatically and rapidly, with little or no effort and no sense of voluntary control (Kahneman, 2011). In contrast, system 2 delegates focus to the effortful mental activities that require it, including complex computations" (Kahneman, 2011, Kindle Loc. 358-60).

The dual-processing model provides additional explanation for individual rioter's preferences, as well as a justification for why they choose to embark in riotous activities. It is especially useful in explaining the preferences of a rioter in conflicts where the long-run costs are considerable, such as in the case of the 2011 London Riots. According to the dual-processing model, a potential participant only experiences system 1 dominated processing once the riot has already begun. This is due to the fact that the presence of the riot is the source of the sufficient level of stress that binds the individual to system 1 processes. As previously discussed, those under the influence of stressors are those who are cognitively "busy," making them more likely to "make superficial judgments in social situations" without concern for the long-run (Kahneman, 2011, Kindle Location 728).

An example of the importance of the dual processes can be seen in the assessment of the costs of participation. For example, a private injury cost, such as the hospital bill, appears as a lower cost in the present tense versus when the cost actually occurs sometime in the future. The reason for this discounting is a lowered system 2 weight, which in turn lowers the value of the potential injury cost in the short-run. This allows the potential participant to perceive the costs of participation as lower during the riot. Then as the riot dissipates, the system 2 weight increases and the individual is provided with an increased perception of cost. A rational

individual can therefore be capable of preferring to riot in the short-run and also have the capability of regretting their decision in the long-run.

In sum, the inclusion of dual-processing systems demonstrate how the act of rioting can be deemed as a rational choice at the time the decision is made and in the short-run due to the dominance of system 1 processing (Thompson, 2010).

4.3 LONDON RIOTS, MORE THAN A SPECIAL CASE

The case of the 2011 London Riots possesses similarities to other riots. While acknowledging that no two riots are identical, and that even the case selected here for comparison maintains several contrasts to the London Riots, there are a sufficient number of parallels in order to say that the 2011 London Riots is not a special case. This suggests that this model may be applicable to other riots. Yet it should be stated that this model is most suitable for analyzing riots that have widespread and copious lootings as well as ineffective initial responses from law enforcement.

A historic riot that greatly resembles the London Riots is the 1992 Los Angeles Riots. The Los Angeles Riots mirror London's in life span, intensity, ineffectiveness of law enforcement and behavior among rioters, while also sharing a similar initial trigger (Bev, 2011). This riot provides an opportunity to evaluate the long-run costs after they have been fully realized, since it occurred over twenty years before the London Riots.

The 1992 Los Angeles Riots, “sparked by a row over racism spread across [Los Angeles, California] and for six days the fires burned and the violence raged” (Leithead, 2011). Commander Andrew Smith, a Los Angeles Police Department street officer at the time of the 1992 riots stated that “looking at the pictures coming out of London really brings back memories of what happened here in Los Angeles 20 years ago” (Leithead, 2011). After being asked to advise on the aftermath and how London could prevent future riots from occurring, Smith pointed out that he sees “a lot of parallels with the behaviour of the rioters in London - they did the same things here then” (Leithead, 2011).

A light into the viewpoint of a previous rioter is provided by Najee Ali, who was one of the gang members involved in the violence in South Central Los Angeles. He

tells of people being “pulled from vehicles and beaten and how local grievances were settled with violence and vandalism” (Leithead, 2011). Now that more than twenty years have passed since the riots, Ali expresses his sorrowfulness: “We set fire to innocent people's property - people who had worked hard to come to America and make a better life for themselves...Some of them never recovered and that is something we can't repay. But they are doing the same in the UK right now - not realising what they are doing, and unfortunately they are going to regret what they did” (Leithead, 2011).

The similarities recognized by journalists, law enforcement and previous Los Angeles rioters all point to the London Riots being more than a special case.

4.4 COST OF PROSECUTION

An important mechanism presented earlier in this work is that expected private penalty of participation is decreasing in n . This is due to the increasing inability of law enforcement to identify and arrest the participants committing crimes, such as looting, as the riot grows. This resembles the argument in Nyborg and Telle (2004) concerning the enforcement of environmental regulations. Nyborg and Telle demonstrate how the high costs of bringing the case to trial plays an essential role in expected private penalty. However, the work also mentions that limited resources play an important role. In the case of riots, it is the limited resources of law enforcement that have the greatest effect on expected private penalty. It is important to note that the limited capacity of law enforcement may imply multiple equilibria. Furthermore, that riots are a good illustration of this, but that the importance of the phenomenon extends beyond riots.

Parallel to law enforcement in general, this study assumes that pursuing suspected violators is costly and limited by the budget of the regulator. It is furthermore presumed that the regulating government prefers full compliance to the law to no compliance, and that this preference is strong since, if no compliance occurs the government will be unable to achieve full compliance even if the entire budget is spent (Nyborg & Telle, 2004). As argued in Nyborg and Telle (2004), the budget set aside for law enforcement and prosecution must be lower than or equal to the

resources spent per violator multiplied by the total population of violators. This can be shown as:

$$B \geq Ne$$

where e is equal to the resources spent per violator. If the regulator's budget is strictly less than Ne , then the regulator's capacity to pursue, and eventually prosecute, violators is insufficient and not all violators can be penalized. Dependent on the available budget for prosecution and the number of current participants in the riot, a participant can expect to face a private penalty, represented by P_i . This work will utilize a simplified version of the equation created by Nyborg and Telle (2004) in order to define a rioter's expected private penalty:

$$P_i = \begin{cases} F\left(\frac{B}{n}\right) & \text{if } n \geq \frac{B}{e} \\ P & \text{if } n < \frac{B}{e} \end{cases} \quad (18)$$

where $F\left(\frac{B}{n}\right)$ denotes the penalty function of regulatory effort and P is the maximum penalty.

This formally demonstrates how the regulator's ability to prosecute and impose penalties on individual rioters is decreasing in n . As the riot grows, the threat of private penalty or harsh punishment becomes less credible. When the number of violators exceeds the set budget, the threat of private penalty becomes insufficient to effectively deter violation which can then lead to the scale of violation increasing.

In this way it can be said that the high cost of pursuing violators creates multiple equilibria, including two stable equilibria. One of these stable equilibria is full compliance with the law, which corresponds to a no riot equilibrium, and the other is an equilibria where there is no compliance with the law, which corresponds to a full riot equilibrium. The tipping point between these two equilibria is where potential participants expect full compliance, or no rioting, to be more costly than facing the potential private penalty from participation. It should be noted that only the expected number of current participants, n , is incorporated in the potential

participant's analysis and that this may in fact differ from the actual current population of the riot, N .

In this way it can be said that the limited resources of the regulating government defines the private penalty of participation, which in turn affects an individual's net gain from participation. This argument once again highlights the importance of the number of expected current participants in a potential rioter's cost-benefit analysis, and reinforces the concept that a riot is a conditional decision.

4.5 POSSIBLE ADJUSTMENT TO THE PRIVATE INTEREST EQUATION

The current composition of the Riot Threshold Model's private interest equation is the result of careful deliberation on what aspects control a prospective rioter's evaluation for participation. The following variable is given additional justification since it is thought to be the most disputable omission to the equation.

A feasible adjustment to the Riot Threshold Model's private interest equation is the inclusion of a variable for the evaluator's current state of income. The reason for this addition to the equation stems from the fact that it has been cited in several reports that individual's took into account what they had to lose when making their decision. Individuals were cited as considering the loss of current jobs, time taken away from the progress of their education, prospects connected to reputation or otherwise as well as the corruption of aspirations they hoped to achieve (Morrell et al, 2011) (R.C. & V.P., 2011). As one mother said, "I would have rioted before, but I've got a baby now, and a flat. I've got too much to lose." 'I'm in college – I've got prospects – I'm not going to throw that away.'" (R.C. & V.P., 2011, p. 70).

An argument for the exclusion of the current state of income is that there is also an overlap in current state of income and private penalty, since the loss of current income can be viewed as an increase in the private penalty. This creates the additional problem that if the current state of income was included, some concepts of cost may be repeated in the equation, biasing the equation with the weight of certain closely related costs.

It then follows that an additional variable for current income is not included in the equation since it is believed that the variable currently representing private

penalty, P , is capable of capturing all of the quantitative losses. In this fashion, the P variable is charged with accurately representing the prospects and aspirations lost if caught and can be said to be equivalent to $P(n, I)$, where private penalty is a function of the expected number of participants and current income.

A second argument for the exclusion of a current state of income variable is that it is dependent on, and only occurs if, the individual is captured. This presents an additional calculative hardship that could introduce unnecessary error. The final argument for not including a separate variable for current state of income is that all current income lost from being caught is from sources that would be represented by not only qualitative but also quantitative data. This poses the problem of how to assess what the value of lost quantitative sources such as "aspirations" may be. This would in turn once again increase the likelihood and presence of error in the equation, which could then misrepresent the individual's cost-benefit analysis. In conclusion, since it is believed that the P variable can absorb all quantitative sources of loss that may be represented in a separate current income variable, and since it may increase the presence of error in the equation, a new variable for current state of income was kept from the final equation.

5 Conclusion

The journey that the mind undergoes when making a decision has intrigued social scientists for generations (Kahneman, 2011). The knowledge gained from past studies encourages further research on the decision-making process as well as on what affects an individual's ability to make rational choices. They also attest to the value of exploring whether the everyday actions of the individuals within a larger population are rational and how they interact with the choices of others.

The Riot Threshold Model provides a method for evaluating individual decisions in a collective environment as it falls into conflict. According to the Riot Threshold Model, the initiation and evolution of a riot is a sequence of individual decisions which string together to produce an aggravated collective action. The decision-making process is ignited by an analysis of the costs and benefits of participation, as seen in the private interest equation, and then weighed against a satisfaction of the individual's threshold requirement at each stage of a riot. A potential participant will consider it optimal to riot if everyone else is rioting. The individual will likewise consider it optimal to not riot when an insufficient number of individuals are expected to be rioting. In this fashion, a group of individuals will coordinate their actions towards a full riot or no riot equilibrium.

In addition to the analysis of costs and benefits being influenced by the number of current expected participation, it can be limited to one of the brain's two processing systems, the intuitive system 1, due to the effects of stressors in the riotous environment. The net benefit arrived at as a result of a limited analysis is then likewise short-sided and blinded to long-run costs. The product is that an individual will be biased towards variables representing the short-run benefits that are dominated by intuitive reasoning. As a result, the individual is more likely to choose participation. This process in total then makes it possible for the utility seeking individual, bound by the stressors in their environment, to arrive at the decision that participation is beneficial.

The explanations and evidence provided for how a potential participant evaluates their net gain from participation can be divided into two closely related theories. The first is that the evaluation is predominately influenced by the current expected number of participants. The second holds that the dominance of system 1 processing in the decision-making process holds the greatest effect. Both result in the lowering of perceived costs and the heightening of perceived benefits. However the first suggests that the individual will agree with their initial decision in the long-run, while the second allows for the participant to later regret their actions. There is support for both alternatives and both seem to play an important role, as seen in the selection of stories presented from the 2011 London Riots. Yet it is when these theories are combined that they can be applied to the largest number of participants of the 2011 London Riots.

These explanations are said to influence the individual's analysis separately or in a combined fashion. Each explanation is able to add to the theoretical understanding of aggravated collective action and lays the foundations for further inquiry. According to both explanations, the individual makes a choice based on the costs and benefits of participation. However, each one holds a different view of the consistency of the individuals' preferences. The first explanation is fully consistent with the standard assumption of stable and time consistent preferences. While the latter would violate such assumptions, demonstrating how an individual may go to watch the riot, planning not to participate, but that in the midst of the riot may choose to join without receiving any new information.

This study is important because it gives insight to the decision-making process of individuals among a riotous crowd. Improvements in crowd management, police and riot engagement protocol and citizen education can be rendered as knowledge is gained about the evaluations a potential rioter may undertake. As the Temporary Assistant Commissioner Chris Allison of the London Metropolitan Police said, "every crowd is different, but if you understand it you're more able to manage it and cope with it in a more effective way" (Challenger, Clegg & Robinson, 2009, p. 252).

The combination and pursuit of multiple areas of study has been undertaken in an effort to provide a greater understanding of the decision-making process in a riotous environment. The objective of this endeavor was to achieve a synchronizing of

the theories of the various disciplines of economics, psychology, neuroscience and sociology. This work hopes to add to the growing literature striving to bring a unification of understanding of how the mind functions. For it is in the unification of these studies that economics is given “a new way to open the "black box" which is the building block of economic systems-the human mind” (Camerer et al, 2004).

One challenge that often presents itself when tackling a concept that extends through many disciplines is the inconsistency among the definitions of critical terms such as ‘rational’ and ‘decision.’ As pointed out by many of the authors quoted in this paper, decision based research may greatly benefit as a whole from any efforts to coordinate these terms. These efforts would ensure productive communication between the various fields of study (Sanfey et al, 2006).

In this study, as with many, the time available placed limitations on the scope and depth of information that could be gathered. Every effort has been made in order to sufficiently address all the models and concepts included. Yet additional information can always be of further benefit. One constraint to this study was the inability to conduct original empirical and experimental research in order to test the Riot Threshold Model. It is therefore a recommendation that experimental research be conducted in order to examine the model as well as its applicability.

An area of interest that could stem from this research is if the Riot Threshold Model is able to address the free-rider problem in collective action. Future research that is related to, but not directly addressed by this work, could be an analysis of the difference between a sufficient level of stress, cognitive load and ego depletion (Kahneman, 2011). Such a study may not only greatly add to our understanding of the decision-making process in riotous environments, but also provides additional tools for crowd management.

It is difficult to suspend research at any junction, but to do so is to allow the call of untold questions to be filled by future investigations. For it is curiosity followed by the pursuit of knowledge which drives research to scale the peaks of current understanding, only to bring the next summit into plain view. It is therefore with the goal of building upon the foundations that have been laid here that this academic odyssey rests until the next work begins.

References

Aldwin, C.M. (2009): *Stress, coping, and development: an integrative perspective*, paperback edition, New York: Guilford Press.

Bénabou, R. (2009): "Groupthink: Collective Delusions in Organizations and Markets," Working Paper, Cambridge, MA: National Bureau of Economic Research, <<http://www.nber.org/papers/w14764>>, [24.02.2012].

Benyon, J. (2012): "England's Urban Disorder: The 2011 Riots," *Political Insight*, 3 (1), p. 12-17.

Berk, R. (1974): "A Gaming Approach to Crowd Behavior," *American Sociological Review*, 39 (3), p. 355-73.

Bev, J. (2011): *London Riots*, Kindle edition, US: Afton Institute, LLC.

Camerer, C., G. Loewenstein and D. Prelec (2005): "Neuroeconomics: How Neuroscience Can Inform Economics," *Journal of Economic Literature*, 43, p. 9–64.
-----(2004): "Neuroeconomics: Why Economics Needs Brains," *The Scandinavian Journal of Economics*, 106 (3), p. 555-579.

Challenger, R., C.W. Clegg and M.A. Robinson (2009): "Understanding Crowd Behaviours: Supporting Evidence," York, UK: The Cabinet Office Emergency Planning College and The University of Leeds, <http://www.cabinetoffice.gov.uk/sites/default/files/resources/supportingevidence1_o.pdf>, [10.02.2012].

Conteh-Morgan, E. (2004): *Collective Political Violence*, paperback edition, New York: Routledge.

Evans, J.St.B.T. (2008): "Dual-Processing Accounts of Reasoning, Judgment, and Social Cognition," *Annual Review of Psychology*, 59, p. 255-78.

----- (2007): "On the resolution of conflict in dual process theories of reasoning," *Thinking & Reasoning*, 13 (4), p. 321-39.

----- (2003): "In two minds: dual-process accounts of reasoning," *TRENDS in Cognitive Sciences*, 7 (10), p. 454-59.

Gabbatt, A. and R. Adams (09.08.2011): "London riots: the third night – Monday 8 August 2011," Guardian.co.uk, <<http://www.guardian.co.uk/uk/blog/2011/aug/08/london-riots-third-night-live>>, [10.02.2012].

Gintis, H. (2009): *The Bounds of Reason: Game Theory and the Unification of the Behavioral Sciences*, hardback edition, Princeton, NJ: Princeton University Press.

Granovetter, M. (1978): "Threshold Models of Collective Behavior," *American Journal of Sociology*, 83 (6), p. 1420-43.

Granovetter, M. and R. Soong (1986): "Threshold models of interpersonal effects in consumer demand," *Journal of Economic Behavior and Organization*, 7, p. 83-99.

Haines, B.A. and C. Moore (2003): "Integrating Themes from Cognitive and Social Cognitive Development into the Study of Judgment and Decision Making," Ch. 8 In Schneider, S.L. and J. Shanteau (eds.) (2003): *Emerging Perspectives on Judgment and Decision Research*, hardback edition, p. 246-83, Cambridge, UK: Cambridge University Press.

Halliday, J. (08.09.2011): "London riots: how BlackBerry Messenger played a key role," Guardian.co.uk, <<http://www.guardian.co.uk/media/2011/aug/08/london-riots-facebook-twitter-blackberry>>, [10.02.2012].

Hammond, K. (2000): *Judgments Under Stress*, hardback edition, New York: Oxford University Press.

Idzikowski, C. and A. Baddeley (1983): "Fear and dangerous environments," Ch. 5 In Hockey, R. (ed.) (1983): *Stress and Fatigue in Human Performance*, p. 123-44, New York: John Wiley & Sons.

Kahneman, D. (2011). *Thinking Fast and Slow*, Kindle edition, New York: Farrer, Straus and Giroux.

----- (2003). "Maps of Bounded Rationality: Psychology for Behavioral Economics," *The American Economic Review*, 93 (5), p. 1449-75.

Kahneman, D. and S. Frederick (2005): "A Model of Heuristic Judgment," Ch. 12 In Holyoak, K. and R.G. Morrison (eds.) (2005): *The Cambridge Handbook of Thinking and Reasoning*, p. 267-94, Cambridge, UK: Cambridge University Press.

Kaufman, B.E. (1999): "Emotional arousal as a source of bounded rationality," *Journal of Economic Behavior & Organization*, 38, p. 135-44.

Koornstra, M. (2005): *Changing Choices: Psychological Relativity Theory*, paperback edition, Leiden, NL: Universiteit Leiden.

Lachman, S. (1996): "Psychological perspective for a theory of behavior during riots," *Psychological Reports*, 79, p. 739-44.

Lane, R. (1991): *The Market Experience*, New York: Cambridge University Press.

Lazarus, R.S. (1991): *Emotion and Adaptation*, Oxford, UK: Oxford University Press.

Lazarus, R.S. and B.N. Lazarus (1994): "Passion and reason: Making sense of our emotions," New York: Oxford University Press.

LeDoux, J.E. (1996): *The Emotional Brain: The Mysterious Underpinnings of Emotional Life*, New York: Simon & Schuster.

Leithead, A. (12.08.2011): "What Los Angeles can teach the UK on riot control," BBC.com, <<http://www.bbc.co.uk/news/world-14501282>>, [10.02.2012].

Levitt, E.E. (1980): *The Psychology of Anxiety*, 2nd ed., Hillsdale, NJ: Erlbaum.

Lewis, P. and J. Harkin (10.08.2011): "Who are the rioters? Young men from poor areas ... but that's not the full story," [Guardian.co.uk](http://www.guardian.co.uk), <<http://www.guardian.co.uk/uk/2011/aug/09/london-riots-who-took-part>, [10.02.2012].

Macy, M. (1991): "Chains of Cooperation: Threshold Effects in Collective Action," *American Sociological Review*, 56 (6), p. 730-47.

Maule, A.J. and G.R.J. Hockey (1993): "State, Stress, and Time Pressure," Ch. 6 In Svenson, O. and A.J. Maule (eds.) (1993): *Time Pressure and Stress in Human Judgment and Decision Making*, hardback edition, p. 83-101, New York: Plenum Press.

McPhail, C. and R.T. Wohlstein (1983): "Individual and Collective Behaviors within Gatherings, Demonstrations, and Riots," *Annual Review of Sociology*, 9, p. 579-600.

Motown's Blog (09.08.2011): "Walworth Road - Only Fools no Horses," Motown's Blog, <<http://motowns.blogspot.com/2011/08/im-no-writer.html>>, [10.02.2012].

Morrell, G., S. Scott, D. McNeish and S. Webster (2011): "The August riots in England: Understanding the involvement of young people," London: National Center for Social Research, <www.natcen.ac.uk/study/study-of-august-riots-in-england>, [26.03.2012].

Nyborg, K. and K. Telle (2004): "The role of warnings in regulation: keeping control with less punishment," *Journal of Public Economics*, 88, p. 2801-16.

Oatley, K. (1992): *Best Laid Schemes: The Psychology of Emotions*, New York: Cambridge University Press.

Oberschall, A. (1978): "Theories of Social Conflict," *Annual Review of Sociology*, 4, p. 291-315.

Overton, W. F. and R.B. Ricco (2011): "Dual-systems and the development of reasoning: competence-procedural systems," *WIREs Cognitive Science*, 2, p. 231-37.

Rolfe, M. (2004): "Social networks and threshold models of collective behavior," preprint version, Chicago: University of Chicago.

Sanfey, A.G., G. Loewenstein, S.M. McClure and J.D. Cohen (2006): "Neuroeconomics: cross-currents in research on decision-making," *TRENDS in Cognitive Sciences*, 10 (3), p. 108-16.

R.C. & V.P., Riots Communities and Victims Panel (2011): "5 Days in August: An interim report on the 2011 English riots," <<http://www.5daysinaugust.co.uk/report/ex-summary/foreword>>, [25.03.2012].
----- (2012): "After the riots: The final report of the Riots Communities and Victims Panel," <<http://riotspanel.independent.gov.uk/wp-content/uploads/2012/03/Riots-Panel-Final-Report1.pdf>>, [29.03.2012].

Silver, M. (1971): "Political Revolution and Repression: An Economic Approach," *Public Choice*, 1, p. 89-99.

Sky News (06.09.2011): "Police Chief: Riots 'Took Us By Surprise'," SkyNews.com, <<http://news.sky.com/home/politics/article/16063444>>, [10.02.2012].

Slovic, P., H. Kunreuther, and G.F. White (1974): "Decision Processes, Rationality, and Adjustment to Natural Hazards," Ch. 1 In Slovic, P. (2000): *Perception of Risk*, hardback edition, p. 1-31, London: Earthscan Publications Ltd.

Stanovich, K.E. (2009): "Distinguishing the reflective, algorithmic, and autonomous minds: is it time for a tri-process theory?," Ch. 3 In Evans, J.St.B.T. and K. Frankish,

(eds.) (2009): *In Two Minds: Dual Processes and Beyond*, p. 55–88, Oxford, UK: Oxford University Press.

Stanovich, K.E. and R. West (2002): “Individual differences in reasoning: Implications for the rationality debate?” In Gilovich, T., D. Griffin, & D. Kahneman (eds.) (2002): *Heuristics & biases: The psychology of intuitive judgment*, hardback edition, p. 421-40, New York: Cambridge University Press.

Thaler, R.H. and H.M. Shefrin (1981): “An Economic Theory of Self-Control,” *Journal of Political Economy*, 89 (2), p. 392-406.

Thompson, H.L. (2010). *The Stress Effect: Why Smart Leaders Make Dumb Decisions--And What to Do About It*, Kindle edition, San Francisco: John Wiley & Sons.

Toates, F. (1995): *Stress: Conceptual and Biological Aspects*, hardback edition, Chichester, UK: John Wiley & Sons.

Tucker, D. (2011): *The Great London Riots of 2011 and other criminal stories*, Kindle edition, US: David Tucker.

Tullock, G. (1971): “The paradox of revolution,” *Public Choice*, 11 (1), p. 89-99.

Tversky, A. and D. Kahneman (1984): “Extensional Versus Intuitive Reasoning: The Conjunction Fallacy in Probability Judgment,” Ch. 1 In Gilovich, T., D. Griffin and D. Kahneman (2002): *Heuristics and Biases*, hardback edition, p. 19-48, Cambridge, UK: Cambridge University Press.

Quinn, B. and R. Adams (09.08.2011): “London riots and UK unrest,” [Guardian.co.uk, <http://www.guardian.co.uk/uk/blog/2011/aug/09/london-uk-riots-day-four-live>](http://www.guardian.co.uk/uk/blog/2011/aug/09/london-uk-riots-day-four-live), [10.02.2012].

Watts, D. (2011): *Everything is Obvious: Once you know the answer*, Kindle edition, New York: Random House, Inc.

Williams, Z. (09.08.2011): "The UK riots: the psychology of looting," Guardian.co.uk, <<http://www.guardian.co.uk/commentisfree/2011/aug/09/uk-riots-psychology-of-looting>>, [10.02.2012].