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Anticipated Regret, Terrorist Behaviour & the Presentation of the Outcomes of Attacks in the Mainstream Media and in Terrorist Group Publications

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Using the same executive function that allows him to plan a terrorist attack, the terrorist can consider the possibility that the outcomes of the attack will be imperfect in some way and that he will regret not having chosen a different type of attack or a different target. He can anticipate regret. In terrorism studies, a lot has been written about the relationship between the volume of media coverage accorded to terrorist attacks and incidences of terrorism. Regret theory, which is a framework for understanding how anticipated feelings of regret can influence the decision-making process, directs our attention beyond the debate over the *volume* of coverage in a general sense to the *presentation* of the outcomes of different terrorist actions. Our analysis generates suggestions for the direction that researchers might take in developing our understanding of the mechanisms by which mainstream media reporting and terrorist group publications shape terrorists' choices.

Key Words: Anticipated Regret, Regret Theory, Media, Terrorist Attacks, Terrorism Studies, Mainstream Media, Terrorist Group Publications.

I. Introduction

Because of the novelty of regret theory and the regret research program to terrorism studies, there are a few preliminary matters that are best addressed before entering upon a discussion of the more technical and specific details. These include explanation of the meaning and usage of certain terminology and elaboration of the reasons why certain discoveries regarding the ways in which anticipated regret shapes decision-making may be worthwhile considering with reference to terrorist behaviour. First, we must distinguish regret from remorse. Second, we must highlight the difference between experiencing regret as a feeling after a choice has been made and the capacity for anticipating this feeling during the decision-making process, *before* a choice is made. Third, we must give reasons for why a particular type of individual, a terrorist, might reasonably be expected to possess this capacity. Finally, we must give some indication of the size of the 'regret effects' that can be expected when decision-making is influenced by anticipated regret. The commonplace nature of the capacity among human beings to anticipate regret, its pervasiveness in even the most mundane of contexts and the systematic patterns of choice consistent with regret theory that have been detected in both experimental and empirical studies provide the basis for our motivation in

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bringing regret theory to terrorism studies. In this opening section of the paper, we address each of these matters in turn.

On those occasions on which they have been asked, terrorists do not reveal any sense of remorse for their actions. Indeed, they appear to believe that their actions are fully justified: “When it came to moral considerations, we believed in the justice of our cause and in our leaders...I don’t recall ever being troubled by moral questions” (Post et al. 2003, p.181). In writing about the influence of anticipated regret on terrorist decision-making, therefore, we must state right at the outset that in this paper ‘regret’ does not mean the terrorist experiences remorse or even a feeling that an act of terrorism might have been avoidable. Rather, what we are referring to is the terrorist’s ability to anticipate a negative feeling associated with counterfactual thinking about how much *better*, how much more effective, a terrorist attack could have been had a different attack method or target or time been chosen. In this sense, the only regret that we are interested in is the regret the terrorist might anticipate as a result of not having taken some different decision while planning a terrorist attack. That is, that the terrorist can anticipate during the decision-making process a feeling of regret at not having chosen, for example, bombing at location A instead of an armed assault at location B. And, having anticipated this regret, make a choice in favour of bombing at location A.

We can expect terrorists to be capable of this type of reasoning for two reasons. First, almost everyone is capable of counterfactual thinking from a young age. Weisberg & Beck (2010, 2012) examined the development in children of the capability to think about what might have been had an alternative decision been made. They found that this capability usually develops by the age of five. The negative emotions associated with counterfactual thinking, regret, develop at about the same age. The development of an *understanding* of those emotions and, with this, the capability to think about one’s own regret and predict others’ regret comes a little later, around the age of seven (Weisberg & Beck 2010). Functional magnetic resonance imaging (fMRI) studies of the neural basis for regret have been able to identify the regions of the brain responsible for counterfactual thinking and regret (Liu et al. 2016). This leads us to the second of our reasons. Although violent behaviour may derive from a particular neurology,¹ counterfactual thinking uses the same executive functions as those required for planning, organisation and problem solving. The ability to think counterfactually develops alongside children’s development of executive function (Burns et al. 2012). A terrorist capable of planning and organising a terrorist attack of any degree of sophistication should be expected to be capable of counterfactual thinking about alternative options that could have been chosen and, therefore, experiencing regret after a choice has been made. Most importantly, he should be expected to be capable of understanding that emotion sufficiently to anticipate it during the decision-making process.²

Terrorism involves unique choices, like any particular context, but there is no evidence to suggest that those choices derive from unique processes. Counterfactual thinking and anticipated regret have been found to emerge and influence decision-making in even the most mundane settings of everyday life. For example, Jang et al. (2016) studied the influence of anticipated regret on consumers’ choices of shopping

¹ The neurology of terrorist violence is still an open research program (see Victoroff 2005, p.26).

² There are no doubt terrorist attacks of such simplicity or for which a leadership group had such control that the perpetrators themselves may not demonstrate a developed executive function. This too is an open research question.

centre and commuters' daily travel choices. Similar findings have emerged in studies of consumers' purchasing decisions (Simonson 1992) and consumers' reactions to promotional marketing offers (Shani et al. 2015). After making a purchase, consumers might regret having done so. However, even *before* making a decision, anticipated regret can influence their choices. Simonson (1992, p.105) uses a simple example to illustrate. Suppose that a decision-maker is approaching the task of searching for a name on a long list. He can start at the beginning or the end. The decision-maker will *experience* regret if he starts at either end and finds the name closer to the other. However, if starting at the beginning is the 'norm', the regret that is experienced will be greater if he starts at the end and finds the name he is looking for closer to the beginning. The decision-maker has the capacity to *anticipate* this regret and it systemically shapes his choice in favour of the 'norm' of starting at the beginning of the list. Analogous behaviour is found to characterise consumer choices as they pertain to quality brand-names vis-à-vis generic or lesser brands.

Regret theory was developed to formalise the effects of anticipated regret on the decision-making process. Since the development of regret theory by Loomes & Sugden (1982) and Bell (1982), much effort has been devoted to determining the size of the 'regret effects' that are predicted by the theory. As we just learned, anticipated regret has been found to shape decision-making in various contexts. More precision regarding the exact size of the effects and the proportion of observed decisions that are consistent with regret theory has been obtained in experimental settings. In a series of studies undertaken during the later 1980s and early 1990s, the patterns of choice predicted by regret theory were found to be both strong and systematic (Loomes 1988a, 1988b, 1989 and Starmer & Sugden 1989). For example, Loomes (1988a, p.54) was able to conclude that regret could account for 80 percent of all patterns of choice among risky prospects observed in a series of experiments (90 percent when combined with disappointment). This significantly outperformed the rival orthodox model, expected utility theory, which was able to explain around 35 percent of the patterns of choice that were observed in a separate series of experiments.

The most basic type of behaviour that we consider in this paper is not very controversial. It is a situation in which a prospective terrorist can anticipate the regret he would feel if his chosen attack method failed to be as successful as one of his alternatives and that, as a consequence, his actions were ignored both by the mainstream media and by terrorist publications and social networks. The research program initiated by regret theory provides a framework within which we can explore the implications of this type of behaviour. Another aspect of our analysis concerns the more technical point that the presentation of the outcomes of terrorist attacks can shape the terrorist's decision-making process by triggering a comparison of different actions in the mind of the prospective terrorist. If the amount of attention that the terrorist pays to various forms of media, including the material circulated by terrorist groups and their supporters, is strong enough that this comparison is triggered then what can be expected to happen next is reasonably well established. That is, the decision-maker who is drawn towards making such a comparison will choose in a certain direction. The origins of this systematic pattern in observed behaviour is still a matter of debate.

Rather than the presentation of outcomes triggering anticipated regret, it could be that the presentation triggers a framing effect. In either case, regret theory has been central to identifying the apparently natural basis for decision-making that pairs of outcomes for different actions seems to provide (Bleichrodt & Wakker 2015, p.505). That is, if framing is responsible for observed regret effects, it is a framing effect that emerges from situations where the decision-maker's attention is directed sharply

towards a comparison of actions and possible outcomes (Harless 1992, p.647). Our discussion of outcome presentation in the context of media reporting is relevant to developing a more complete understanding of the nature and role of framing effects in the terrorism context. As terrorist groups become more sophisticated in their strategic production and use of online material, developing our understanding of the ways in which this material influences the decisions of would-be recruits might be best approached from the theoretical perspectives provided by decision theory, including regret theory.

This paper is organised as follows. In the second section, we explore some possible ways in which regret effects may emerge to shape terrorist choice in the terrorism context. In the third section, we discuss regret theory as a model of decision-making under conditions of risk and uncertainty. The reason why regret theory allows and, indeed, predicts changes in preferences when outcomes are presented in different ways is explained. Interestingly, the power of outcome presentation is such that decision-makers will change their preferences when outcomes are presented differently even when all of the alternatives available to a decision-maker are fundamentally the same. We also explore the role of other phenomena, including event splitting, in producing similar patterns of decision-making. In the fourth section, the implications of regret effects are discussed with reference to the presentation of terrorism related information in both the mainstream media and in terrorist group publications.

II. How Anticipated Regret May Come to Influence Terrorist Choice

Terrorist groups' (online) publications have been a subject of contemporary research enquiry. At first, the primary focus was on the nature of the content and its distribution (see Klausen 2015). Subsequently, researchers have been interested not only in the nature of the content but its effectiveness at creating support for the terrorist group and mobilising would-be recruits (Barcelo & Labzina 2018). Perez-Torres et al. (2018) analysed al-Qaeda's English language publication, *Inspire Magazine*, and determined that the magazine serves a multifaceted purpose including recruitment, provision of tactical advice and coverage of past and recent successes. These types of publications, as well as mainstream media reports, provide information about terrorism (attack type, weapon, fatalities etc.) that prospective terrorists might make use of in any number of ways, including forming the basis for expectations or as reference points for copycat actions. Beyond this, though, we are interested in the implications for terrorist choice of the case where a terrorist imagines not only the depiction of his attack as a success but also the regret that he would feel if the method he chooses from the available options produces a failure instead.

Essentially then, anticipated regret might emerge in a terrorism context to shape terrorist choice whenever the terrorist can imagine not just a success or failure but a success that might have been even better or a failure that might have been avoided had a different approach to perpetrating the attack been chosen. The comparison of alternatives, either in reality or in the imagination, is central to the emergence of the systematic patterns of choice that regret theory predicts and which have been observed in various settings. Terrorist groups' publications present the outcomes of different attacks. A prospective terrorist can imagine his actions to be praised there or, if the action fails, to be ignored. This is enough information for counterfactual thinking. Even in the mainstream media, different types of attacks are often compared with each other. *Time* magazine, like most other publications, periodically presents timelines or histories of terrorist activity. Consider, for example, the story published on December 21 2017 entitled "A Timeline

of Recent Terrorist Attacks in Australia” (Quackenbush 2017). In the story, one after the other, different attacks and their outcomes are listed, beginning with the stabbings at Endeavour Hills in September 2014 and ending with the so-called Brighton siege in June 2017. Here are two descriptions of consecutive attacks from the series covered in the report:

2015 Parramatta Shooting

On October 2, 2015, 15-year-old Farhad Khalil Mohammad Jabar shot and killed Curtis Cheng, a 58-year-old accountant, in the western Sydney suburb of Parramatta. Five men were arrested in connection to the killing, which New South Wales Police deputy commissioner Catherine Burn called a “terrorism event”.

2016 Minto Stabbing Attack

On September 20, 2016, a 22-year-old man inspired by ISIS stabbed an unknown man in the Sydney suburb of Minto. The culprit was charged with committing a terrorist act and attempted murder.

Although magazines and newspapers are ‘print based’, all of the stories to which we refer throughout this paper can be found online, many with accompanying video and graphics. For example, the comparison of 2017 attacks in Britain on the BBC News website (Casciani 2018). Researchers have long worried that reporting on terrorism might encourage further acts of violence. Our concern in this paper is not with the reporting but with the presentation. In the *Time Magazine* report, there are two different actions: shooting and stabbing and two different outcomes. One person dead; one person injured. This type of presentation makes it very easy for the outcomes of different actions to be juxtaposed. That this could be a problem has not previously been identified in the terrorism studies literature. From economics and decision theory, however, we know that outcome presentation can influence decision-making. When these decisions involve alternative forms of anti-social activity, the presentation of outcomes is important because decisions may be shaped in undesirable ways. This applies to terrorism and other forms of highly publicised violence, including school shootings. And it applies to outcomes presented by mainstream media in all of its forms (video, print, online) as well as to terrorist group publications.

Anticipated regret is important because it systematically influences decisions. Presentation of outcomes is important because it systematically influences anticipated regret. These are the two primary conclusions from more than thirty years of research into the effect of anticipated regret on decision-making. From related research, we also know that people will assign a greater weight to an outcome when it appears twice, even though the actual probability of the outcome is the same. This is called ‘event-splitting’. Both juxtaposition effects and event-splitting effects suggest that the way outcomes are presented to decision-makers influences their choices. To see the relevance and potential importance of these findings, imagine a situation, purely hypothetical and idealised for the moment, where a terrorist group planning an attack is confronted with the information in Table 1 about the outcomes of 10 terrorist incidents recorded in the previous year. Imagine also that, to some degree, a terrorist group takes this information into account in making its decision about which attack method to choose.

Table 1: Incidents Recorded in the Previous Year (Fatalities per Attack)

| Attack Method | In 6 Incidents... | In 1 Incident... | In 3 Incidents... |
|---------------|------------------------|------------------------|-------------------------|
| 1 | 4 Fatalities Inflicted | 0 Fatalities Inflicted | 0 Fatalities Inflicted |
| 2 | 0 Fatalities Inflicted | 0 Fatalities Inflicted | 10 Fatalities Inflicted |

In considering the two attack methods, the terrorist group's leadership may anticipate the regret that they will experience if they choose attack method 1 while another group chooses attack method 2 and achieves the higher outcome. In this case, the anticipation of regret causes the terrorist group's preferences to drift towards attack method 2. Next, imagine that the terrorist group confronts the information in Table 2 concerning two other attack methods, 3 and 4.

Table 2: Incidents Recorded in the Previous Year (Fatalities per Attack)

| Attack Method | In 3 Incidents... | In 3 Incidents... | In 4 Incidents... |
|---------------|-------------------------|------------------------|------------------------|
| 3 | 4 Fatalities Inflicted | 4 Fatalities Inflicted | 0 Fatalities Inflicted |
| 4 | 10 Fatalities Inflicted | 0 Fatalities Inflicted | 0 Fatalities Inflicted |

This time the terrorist group's decision-makers focus on the regret that they will experience if, in pursuing the higher outcome with attack method 4, they achieve zero fatalities when attack method 3 seems to offer a relatively sure chance of inflicting four fatalities. With this presentation of outcomes, preferences drift in favour of attack method 3. Of course, attack method 3 is the same as attack method 1 and attack method 2 is the same as attack method 4 but the choice differs depending on how the outcomes are presented and, in particular, the way in which 10, 0 and 4 fatalities are juxtaposed. This explanation and prediction from regret theory is complemented by event-splitting effects. Notice in the example how four fatalities is listed twice in Table 2. This can lead the decision-maker to assign a greater weight to this outcome even though the probability that the terrorist will inflict four fatalities is the same for attack methods 1 and 3. When the outcomes are presented in a particular way, a more violent attack method can become the preferred choice. The influence of juxtaposition effects, through the agency of regret, and event-splitting effects were discoveries that emerged from research into a model of the decision-making process developed by Bell (1982) and Loomes & Sugden (1982)³ called 'regret theory'.

Regret theory and the research program that grew from it has many potential implications for our understanding of terrorist behaviour and it holds particular relevance for that field of terrorism studies referred to as 'media and terrorism'. We know that terrorist groups get information about terrorism from the media, including information about how much attention different types of terrorist attacks receive. This can include reports published in print, online or video by the mainstream media as well as organised dissemination of information by terrorist groups or their supporters. At least some of that information is relevant to the group's plans and operations; for example, how successful or unsuccessful another group has been with a particular type of attack, in terms of fatalities, ransoms or concessions extracted from a

³ The timing of the initial theoretical framework was less than favourable, coming on the heels of Kahneman & Tversky's (1979) prospect theory and swept up in the many attempts to generalise expected utility theory (Machina 1982; 1987, Quiggin 1982, Chew 1983, Yaari 1987 and Schmeidler 1989).

government. Such information is relevant to the rivalries that exist between terrorist groups and provides a foundation for reference points that shape terrorists' choices. For example, the Red Army Faction (RAF) and 2nd of June Movement, active in Germany in the 1970s, carefully considered the actions that were perpetrated by the other group and made decisions that reflected that consideration (Pohl 2015, Phillips & Pohl 2014; 2018).

The possibility of a link between violence portrayed in the media and violent behaviour has been a longstanding concern across many different fields of enquiry (Dahl & DellaVigna 2009). The influence that online distribution of terrorist propaganda has over potential recruits is an important modern development in this research program. The relationship between mainstream media coverage of terrorism and terrorist behaviour has been contentiously debated for a long time. In the 1970s, terrorism was often described as 'theatre' and it was recognised that terrorism required an audience and, indeed, that terrorists desired an audience. The idea that the relationship between the media and terrorist groups is symbiotic was widely held and some people believed that the media caused terrorism.⁴ Here is but one of the many hundreds of examples that one can find on this point in the literature from that period (Kalinowski 1979, p.91):

The student turned leftist terrorist must arrange events that will assure that, through the media, he has both official and public attention. His actions become more and more sensational; and to remain credible there can be no doubt that he will act on his threats... The terrorists seek attention and publicity for their cause. The world becomes a stage as contemporary media enable the group's goals to be effectively dramatised.

Even though it is clear that the mainstream media cannot start a terrorist movement and cannot be fundamentally responsible for terrorism existing as a phenomenon (Wilkinson 1997, p.52), a potential chain of causality running from the media to terrorist actions is something that still worries some researchers (Rohner & Frey 2007; Jetter 2017).⁵ Although there is some evidence to support 'causality' in a very technical sense, the idea that media reporting can be practically curtailed is unrealistic. Because of this, rather than dwelling on the old debates about whether terrorist attacks should be reported by the media, we would like to change the nature of the discussion and concentrate instead on a more subtle question. That is, how the outcomes of terrorist attacks should be presented in the media. During the course of this discussion, many of the findings that we report are applicable, perhaps even more directly, to the influence that terrorist groups' publications have over their supporters. The factors that determine the effectiveness of terrorist group propaganda disseminated online or through social media, has become an increasingly popular topic for research for obvious reasons. Regret research provides some indications that contribute to the search for an explanation of why and how such material might 'work'.

⁴ A review of the debate is presented by Wilkinson (1997).

⁵ In the most recent study of its kind, Jetter (2017) analysed *New York Times* coverage of tens of thousands of terrorist attacks. He concludes that one *New York Times* article produces 1.4 terrorist attacks the following week. Simply, Jetter concludes that "...if terrorists do not receive media attention they will attack less".

III. Regret Theory

During the 1980s, a number of generalisations of the orthodox model of decision-making were developed. These models all retained one of the core foundations of expected utility theory: transitivity (Bleichrodt & Wakker 2015). Transitivity requires that for three risky prospects, L_1 , L_2 and L_3 , the decision-maker's preferences are such that if $L_1 > L_2$ and $L_2 > L_3$, then $L_1 > L_3$. Regret theory was the first of the major contributions to the new wave of decision-making models to abandon transitivity and, indeed, to predict intransitive preferences.⁶ None of the preference orderings determined by prospect theory or any of the other generalisations of expected utility theory exhibit the 'cycles'⁷ characteristic of intransitive preferences: $L_1 > L_2 > L_3 > L_1$. Intransitivity is introduced into regret theory because the model allows for outcomes of different actions to interact, something that the other models disallow.⁸ In turn, this is the theoretical foundation for the prediction that alternative presentations of outcomes lead to different choices because alternative presentations induce different feelings of anticipated regret.

An example of outcome interaction is observed when a decision-maker is asked to consider the first part of Allais' (1953) famous problem. Decision-makers are asked to choose either:

A: \$1,000,000 for certain; or

B: \$5,000,000 with probability 0.10, \$1,000,000 with probability 0.89, \$0 with probability 0.01

From the perspective of regret theory, the outcomes of the two alternatives interact with each other or are matched against each other. Choosing A and then seeing that a choice of B would have resulted in \$5,000,000 generates regret. This regret can be anticipated by matching \$5,000,000 against \$1,000,000 during the decision-making process. Likewise, choosing B and receiving nothing when a certain \$1,000,000 was on offer also generates regret. This regret can be anticipated by matching \$0 against \$1,000,000 during the decision-making process. The larger anticipated regret overrules the smaller anticipated regret. In this example, the matching of \$1,000,000 against \$0 produces the larger anticipated regret for most people and most people choose A. This matching process or outcome interaction is a unique and fundamental part of regret theory. This is what regret theory suggests was happening in the example we presented at the beginning (Tables 1 and 2). The different outcomes of choosing a different terrorist attack, 4, 0, 10, are matched in different ways depending on how they are presented and this matching induces different feelings of anticipated regret.

Perhaps the most startling demonstration of the influence that outcome presentation can have on decision-making concerns situations in which all of the alternatives that are available to the decision-maker are exactly the same. For example, consider the attack methods of hijacking, hostage-taking, bombing and

⁶ This prediction has found both support and criticism (Loomes & Taylor 1992; Sopher & Gigliotti 1993). Transitivity is sometimes encumbered with the burden of being the hallmark of rationality and this has raised the stakes in this debate. The systematic intransitivity reported by Tversky (1969) startled scholars and prompted a longstanding dispute about the robustness and implications of such findings (see Fishburn 1991; Birnbaum & Gutierrez 2007).

⁷ In economic theory, preference cycles are treated most fully within that part of the literature that deals with revealed preference theory and consumer choice. This is a somewhat different theoretical context to the theory of decision-making under risk and uncertainty but there are certain parallel arguments (see, for example, Varian 1982).

⁸ The other generalised expected utility models allow for probabilities (beliefs) and utilities (tastes) to interact but not outcomes (Bleichrodt & Wakker 2015, p.499).

armed assault and their hypothetical expected fatalities listed in Table 3. The outcomes of each attack method are exactly the same but regret theory predicts that the terrorist decision-maker will always prefer one of the attack methods. Furthermore, these preferences will be cyclical and non-transitive and will oscillate depending on how the outcomes are arranged. According to regret theory, the (0,9) pairs of expected fatalities, where anticipated regret is the largest, are matched against one another. This generates a preference for bombing over armed assault (column 1), a preference for hijacking over bombing (column 2), a preference hostage-taking over hijacking (column 3) and, completing the cycle, a preference for armed assault over hostage-taking (column 4). These preferences will be different if the outcomes are presented differently. This is a very surprising conclusion given that there is no difference between the alternatives.

Table 3: Attack Methods & Transitivity: Expected Outcomes (Fatalities)

| Attack Method | Probability = 0.25 | Probability = 0.25 | Probability = 0.25 | Probability = 0.25 |
|----------------|--------------------|--------------------|--------------------|--------------------|
| Armed Assault | 0 | 3 | 6 | 9 |
| Bombing | 9 | 0 | 3 | 6 |
| Hijacking | 6 | 9 | 0 | 3 |
| Hostage-Taking | 3 | 6 | 9 | 0 |
| Armed Assault | 0 | 3 | 6 | 9 |

Expected utility theory and prospect theory are unable to distinguish between the alternatives presented in Table 3 and the decision-maker would be predicted to be indifferent between them. How, then, did regret theory come to predict not only that there will be a preferred action but that the decision-maker's preferences will change depending on how the outcomes are presented? Most directly, the answer to this question is that regret theory defines preferences over the task of choosing from among prospects (Starmer & Sugden 1989). Expected utility theory and prospect theory, by contrast, define preferences simply over prospects, not over the action of choosing from among them. When ordering prospects, the decision-maker looks at the outcomes and probabilities for each prospect and arrives at a ranking based on either prospect value or expected utility. When the prospects are the same, as they are in Table 3, the result of this process will be an equal utility number given to each prospect and the decision-maker will be indifferent. When the decision-maker instead tries to arrive at an ordering over the act of choosing an action, the outcomes are not considered in isolation. They interact as the decision-maker contemplates the possibilities, "If I choose A and achieve zero when I could have chosen B and achieved 9..." Even when the prospects are the same, choosing one of them in particular may seem like the best action to take.

The next question to be answered is a formal one. How does regret theory encompass this type of decision-making process into a theoretical framework? It does so with a relatively minor adjustment to the orthodox expected utility formula. The formal expression of regret theory in contemporary notation and terminology is due to Bleichrodt & Wakker (2015, p.494). We only depart from their notation in denoting the utility function by $u(\cdot)$. Regret theory says that a decision-maker will prefer action A to action B, $A \succcurlyeq B$, if and only if:

$$\sum_{j=1}^n p_j Q\{u[A(s_j)] - u[B(s_j)]\} \geq 0$$

Here, $S = \{s_1, \dots, s_n\}$ is a state space with exactly one 'true' state, s_j . The decision-maker is uncertain about which state from n possible states is s_j . An action or decision is denoted by $(A, B \dots)$ and each action has a consequence or outcome for each possible s . The likelihood of each state occurring is $p_j = P(s_j)$. In regret theory, the utility of A is affected by imagining (or knowing that it will be revealed at some point) what would have happened if B had been chosen. That is, the difference between the utility experienced as a result of outcome s_j following a choice of A and the utility that would have been experienced as a result of outcome s_j following a choice of B . This is the interaction of outcomes described previously. The regret functional, Q , reflects the decision-maker's pleasure when this difference is positive and regret when this difference is negative. The regret functional is the net advantage of choosing A and rejecting B in the event that state j occurs (Loomes 1988b, p.464). Without the regret functional or for the case when $Q = 1$, the model is simply the orthodox expected utility model. Formally, then, regret theory can encompass the decision-making process that we have discussed by incorporating the utility difference in outcomes between alternatives and shaping that utility difference by a non-linear function.

It was the development of this formal treatment of regret theory with its surprising implications that initiated a substantial growth in regret research across economics and psychology. Regret, as most people will already know, is experienced by a decision-maker upon realising or imagining that a situation would have been better if a different decision had been made (Zeelenberg & Pieters 2007, p.3). Regret is an unpleasant emotion that stems from counterfactual thinking involving the comparison by the decision-maker of the payoff or outcome that has been obtained with other possible outcomes, real or imagined (Zeelenberg et al. 1998). Regret research is multidisciplinary and has come to encompass other related phenomena, such as disappointment.⁹ A person is disappointed that she did not win the lottery. She regrets not having purchased a ticket. Regret is choice centric whereas disappointment is situation centric (Zeelenberg et al. 1998, p.121; Bell 1982, 1985; Loomes & Sugden 1982, 1986, 1987; W.W. van Dijk & Zeelenberg 2002; E. van Dijk & Zeelenberg 2005). Most importantly, regret can be anticipated. As such, it can shape decisions in a forward-looking sense.

Anticipated regret is found commonly in contexts where the decision-maker knows that he or she will be able to observe the outcomes of alternative choices at some time in the future (Zeelenberg 1999, Humphrey 2004). A prospective terrorist might expect that the outcomes that he achieves will be either ignored or compared in terrorist group publications or online propaganda with those outcomes achieved

⁹ For example, Zeelenberg and Pieters (2007, p.3) in their review article list contributions from psychology, marketing, organisational behaviour, medicine and neuroscience. The short series of articles that followed immediately in the wake of this review and theoretical development provide a broader introduction to the nature and scope of the research program. See Inman (2007), Roese, Summerville & Fessel (2007), Pieters & Zeelenberg (2007), Zeelenberg *et al.* (2008). For an example of studies undertaken within the field of neuroscience see Liu *et al.* (2016). Major contributions to regret research are from Bell (1982, 1985), Loomes & Sugden (1982, 1986, 1987), Kahneman & Tversky (1982), Gul (1991), Kelsey & Schepanski (1991), Larrick & Boles (1995), Mellers *et al.* (1997), Zeelenberg & Pieters (2004), E. van Dijk & Zeelenberg (2005) and Martinez, Zeelenberg & Rijsman (2011). Connolly & Zeelenberg (2002) present a concise overview of the main findings developed in the literature.

by others contemporaneously or historically using different methods. The outcomes achieved using a different type of action will be observable at some point. However, the prospective terrorist does not necessarily require tangible resolution of 'what might have been' in order to anticipate feelings of regret. He may compare the outcomes of different actions through imagination. Research suggests that counterfactual thinking based on comparison of actual and imagined outcomes carries just as much weight in the decision-making process (Bar-Hillel & Neter 1996). Whether the counterfactual thinking is based on real or imagined outcomes, the feelings of regret that can be anticipated from choosing one action over another influence the choice of action during the decision-making phase.

Much of the earlier research focussed on the ways in which anticipated regret caused people to behave in a more risk averse manner (Bell 1982; Josephs et al. 1992; Simonson 1992; Zeelenberg 1999; Nordgren et al. 2007). Decision-makers might find themselves confronted with a choice between (1) receiving a favourable outcome for sure and (2) taking a chance on receiving a better outcome accompanied by a small chance of receiving a worse outcome. In such cases, the decision-maker will often choose option (1) (Allais 1953). An explanation for this choice could be that in assessing option (2), the decision-maker anticipates the feelings of regret that will be experienced if the worse outcome is realised when the favourable outcome of option (1) could have been secured. The first option with its sure outcome is favoured because it avoids the anticipated feelings of regret. Hence, anticipated regret results in higher risk aversion and the less risky alternative being selected.

This might lead us to conclude that whenever anticipated regret affects the decision-making process, the terrorist or terrorist group could be expected to choose a lower risk action. Unfortunately, the matter is not so straightforward. Anticipated regret may also result in risk seeking behaviour (Larrick & Boles 1995; Ritov 1996; Zeelenberg 1999). It seems, as Zeelenberg (1999) and Zeelenberg & Beattie (1997) argue, that *either* the more risky or the less risky alternative may be the regret minimising choice under different circumstances. To test this hypothesis, Zeelenberg & Beattie (1997) designed an experiment in which the opportunity for counterfactual thinking was controlled. Subjects were given the following choice problem (Zeelenberg & Beattie 1997, p.66):

Your uncle has just died and left you \$1000. You now have to decide how to invest the money for five years. Your uncle has also left your sister \$1000, but her money is already invested for the same five year period in a government bond, which is guaranteed to pay back a total sum between \$1000 and \$1800 at the end of five years. You can choose to invest your money in this type of investment too. A friend has just told you about another type of investment that you could choose, a high interest account, which is guaranteed to pay back a total sum of between \$1250 and \$1350 at the end of five years. You know that at the end of the five years you will find out how much money you would have made if you had chosen the government bond because your sister will tell you.

In this scenario, the risky option is the government bond. It might return nothing beyond the original investment or quite a bit more. The safe option is the high interest account, which always returns a gain but with less upside. The opportunity for counterfactual thinking was controlled by removing the sister character. In the experiment, subjects were asked, under these differing control conditions, to indicate how strongly they preferred either option. When no feedback would be received on the outcome of the risky option, subjects preferred the safe option (risk averse). When feedback would be received (from the sister character), subjects preferred the risky option (risk seeking). These findings supported the conclusion that

regret effects could influence risk preferences in either direction. When considering alternative attack methods, the terrorist might choose either the more risky or less risky option depending on which attack method minimises the feelings of regret. In a context where actions are praised (or ignored) in terrorist group publications and online dissemination of propaganda, a prospective terrorist may be prompted by imagining the representation of his actions there to choose a more risky alternative. Simply the presence of such terrorist group publications may prompt more risk seeking by some individuals. The function of these publications might be partially performed through the agency of regret. This is not something that has been explored up to this point.

The choice of attack method (or location etc.) is not the only aspect of terrorist behaviour that can be influenced by regret. The timing and intensity of terrorist actions may also be influenced. There is evidence to suggest that decision-makers are more likely to escalate their commitment to a losing course of action when the possibility of later regretting withdrawal is perceived to be higher (Wong & Kwong 2007; Ku 2008). This may help us to understand why some terrorist groups escalate their engagement despite every indication of failure. Because terrorism is characterised by a strong sociological dimension, the social network of the terrorist and terrorist group must be taken into account if we are to understand more deeply the temporal structure of terrorist activity; this includes the terrorists' decisions to engage, disengage, escalate or enter shorter or more prolonged planning phases. The terrorist's social network is at least partially facilitated by online activity.

Many years ago, Janis and Mann (1977) identified the importance of significant people within a social network to decision-makers' anticipation of regret. In particular, significant people in the decision-maker's social network may encourage careful planning (Zeelenberg 1999, p.103). Even if these significant people are impatient, the decision-maker's fear of disappointing them and the anticipation of regret that he will feel under such circumstances may prompt a more careful weighing up of the alternatives. Within a terrorist network, terrorist operatives who are working under the direction of leaders who they do not wish to disappoint may extend the planning phase that is undertaken prior to an action. There is also a relationship between feelings of responsibility and regret. The more the decision-maker feels responsible for the decision that resulted in a negative outcome, the more regret is experienced (Zeelenberg, van Dijk & Manstead 1998; Frijda et al. 1989; and Gilovich & Medvec 1994). Simply accepting 'orders' may allow the terrorist decision-maker to alleviate responsibility and, at the same time, any anticipated feelings of regret.

In some cases, circumstances and a prolonged planning phase contribute to terrorist groups missing an opportunity to act. Psychologists and decision theorists have found that prior inactions decrease the likelihood that an action will be taken in the future.¹⁰ When an attractive opportunity to act has been forgone, decision-makers are less likely to act on favourable opportunities that present themselves in the future (Van Putten et al. 2013, p.124). This is called 'inaction inertia' and feelings of regret may explain it. Tykocinski & Pittman (1998) found that missing a favourable opportunity results in the unfavourable comparison of a current opportunity with the missed opportunity even in cases where the current opportunity is still a positive one. If the terrorist group is pre-empted by a rival group, regret at not having

¹⁰ This is the opposite of the more obvious finding that once people commit to an action they are more likely to stick with it (see Van Putten *et al.* 2013, p.124).

taken advantage of the opportunity may result in inaction inertia and postponement of terrorist activity for some period of time.

Regret research can prompt us to think about terrorist behaviour in new ways. After considering some of these perspectives, we return to the primary prediction of regret theory: outcome presentation influences decision-making. The identified regret effects can be divided into juxtaposition effects and event-splitting effects. These related phenomena each shape preferences in similar ways and each suggests that the way that outcomes or consequences are presented is an important factor influencing decisions. Economists have focused much of their attention on testing juxtaposition effects and event-splitting effects (Loomes 1988a, 1988b, 1989; Starmer & Sugden 1989, 1993; Harless 1992; Humphrey 1995; Leland 1998). The evidence as to which of these effects is the dominant one has ebbed and flowed. Early tests found that juxtaposition effects were dominant (Loomes 1988a, 1988b; Starmer & Sugden 1989). Later tests found that event-splitting effects were more dominant and might explain most of the patterns of choices that had been observed (Starmer & Sugden 1993). Later still, tests attributed at least part of the observed behaviour to some combination of juxtaposition, event-splitting and framing (Harless 1992; Starmer & Sugden 1998; Humphrey 2001a).

Although the literature is technical, some primary results can be listed. The reason why outcome presentation affects decision-making is a composite of the following three factors, each of which emerges in different settings to different degrees: (1) When outcomes can be compared and juxtaposed, regret effects emerge as decision-makers compare the outcomes or consequences of different actions; (2) When an outcome appears twice (or more), event-splitting effects emerge as people assign greater weight to that outcome than the underlying probability would justify.¹¹ More generally, as illustrated in Table 2, when a prospect might generate either a positive outcome or a 'zero' outcome, splitting the positive outcomes increases the attractiveness of the prospect (Humphrey 2001b); (3) When outcomes are presented in particular ways (in tables, matrices, words), framing effects emerge which have similar properties to both juxtaposition effects and event-splitting effects. Harless (1992) found that presenting outcomes in tabular or matrix form results in choices being shaped by juxtaposition effects but that when the same outcomes are described by 'ticket numbers'¹² the juxtaposition effects tend to disappear along with the associated regret effects. If the outcomes are clarified again, the regret effects return.

The way that outcomes or consequences are presented shapes decision-making by introducing some or all of the above factors. Starmer & Sugden (1998, p.360) conclude that individuals appear to deploy a rule of thumb (heuristic) that involves making comparisons between alternative actions. Whenever outcomes can be clearly compared, regret, juxtaposition, event-splitting and framing effects begin to shape the decision-making process. The evidence that has been accumulated for many years supports one essential conclusion. That is, the presentation of outcomes or consequences matters. Whenever the presentation "sharply directs the decision-maker to compare acts and states [outcomes]", (Harless 1992,

¹¹ For example, consider the split event in Tables 1 and 2. The chance of inflicting 4 fatalities is 0.60 in each case. However, when the event '4' is split into two portions of 0.30 each, the weight (π) attributed to the outcome will be greater than 0.60. That is, $\pi(0.30 + 0.30) > \pi(0.60)$ (Starmer & Sugden 1993, p.239).

¹² A ticket number representation of the payoffs in Table 3 for example, would convey to the decision-maker (without using a table or matrix) that drawing tickets 1-24 would give a payoff of 9 for armed assault and 6 for bombing; tickets 25-49 would give a payoff of 6 for armed assault and 3 for bombing and so on.

p.647) decision-making is likely to be influenced in predictable ways. When these decisions are violent and anti-social in nature, any factors that influence decisions in undesirable directions, however marginal they may seem, acquire added significance.

IV. The Presentation of the Outcomes of Terrorist Actions

There is an ongoing research program generally referred to as 'media and terrorism' to which the findings emerging from the study of regret are relevant. Early studies of media and terrorism considered the themes of 'terrorism as theatre' or 'theatre of terror' and this has been enduring (Alexander & Finger 1979; Kupperman 1979; Alexander 1980; Wurth-Hough 1983; Weimann 1985; Rubin & Friedland 1986; Nacos 2003; Weimann 2005 and Shoshani & Slone 2008). Having established more or less common agreement that terrorists 'desire' media coverage, research has covered such problems as the potential for a symbiotic relationship to exist between the media and terrorists (Bell 1979; Martin 1986; Farnen 1990; Wilkinson 1997 and Shoshani & Slone 2008), the analysis of the nature of media reporting on terrorism (Kelly & Mitchell 1981; Weimann 1985; Martin 1986; Carpini & Williams 1987; Picard & Adams 1987; Chermak & Gruenewald 2006), the media strategies that terrorists may have developed (Hacker 1980; Schmid & de Graff 1982; Nacos 1994, 2002, 2003; Weimann & Winn 1994, Martin 2003; Surette et al. 2009; Galily et al. 2015 and Yarchi et al. 2015), the role that media coverage may play in 'contagion' or, even, in 'causing' terrorism and the policy debate concerning the constraint of media coverage of terrorism (Fenyvesi 1979; Miller 1979; Midlarsky et al. 1980; Mazur 1982; Holden 1986; Schmid 1989; Nelson & Scott 1992; Weimann & Winn 1994; Scott 2001; Rohner & Frey 2007 and Jetter 2017).¹³

An important question concerns the degree to which terrorists' choices are shaped by media attention. Some authors have analysed terrorist acts in Germany specifically from the perspective of a deliberate communication strategy; they include: Elter (2006, 2008) on the Red Army Faction (RAF) and the media; Kraushaar (2006) on a "Kleinkrieg" (small scale war) by groups including the RAF against Axel-Springer publishers; Gätje (2006) on the RAF's "info-system" and the group's internal communication strategy; Glaab (2007) on the RAF and the media during the 1970s; Balz (2008) on the media strategies of the RAF (pp. 52-76) and news management during the "escalations" of 1977 (pp. 255-320). It is significant to note that the RAF has been the subject of almost all of these analyses. It is also timely to reiterate a point frequently made in the literature; see for example Elter (2006, p. 1068) and Glaab (2007, p. 31): Terrorists can influence to a considerable degree *if* media coverage is likely to occur in response to an act of terrorism that has been carefully staged to make a newsworthy story. Influence, however, on *how* and *how much* the media will report is much more difficult to achieve and is subject to the uncertainties that characterise terrorist activity.

Some researchers have studied the media strategies of specific terrorist, militant, or political groups and have provided insights at various levels of detail; for example, the media strategies of Hizbollah are examined by Weimann (2005); those of the German RAF are outlined by Steinseifer (2006), Glaab (2007), and Elter (2006, 2008); those of the Spanish Euskadi Ta Askatasuna (ETA) by Glück (2007); Islamist groups by Richter (2007); Al Qaeda by Payne (2009); the Corsican Nationalist by Hoffbauer (2011); the

¹³ Also see Ross (2007) for a review.

Global Islamic Media Front by Torres Soriano (2012); and Jihadist terrorists by Amble (2012) as well as Klausen (2015). All of this research indicates that what is reported in the media is relevant to terrorists and their strategies. Only more recently have researchers turned their attention towards the way in which different amounts of attention accorded to different terrorist actions shape a terrorist's choice of action. Preliminary findings in this regard point to a combination of rational and behavioural influences that might be observed to shape terrorist choice when terrorists consider the amount of attention accorded to different actions (Pohl 2015, 2017). In particular, the amount of attention accorded to a particular action or a rival terrorist group may become the reference point from which a terrorist group assesses its prospective actions.

The outcomes of terrorist actions are reported *by* the media. This includes not only the mainstream media but also social media and terrorist groups' own online publications and propaganda. The amount or volume of coverage has been a primary concern in the literature. This has recently been broadened to include various aspects of the nature and intention of online material published or released by terrorist groups or their supporters. Rather than dwelling on the volume or the amount of attention accorded to terrorism, we want to highlight the specific ways in which the outcomes of different terrorist actions are *presented* in all of the traditional and emerging media platforms. Regret research, starting with the juxtaposition effects predicted by regret theory and extending to event-splitting effects and framing effects, informs us of the possibility that decision-making may be shaped by the ways in which the outcomes of different actions are presented. In particular, the importance of 'pairs of outcomes' for different actions as a basis for decision-making is the primary theoretical and empirical result, the relevance of which we wish to highlight for terrorism studies.

In the mainstream media, there are very many examples of reports (in print, online or video) that present histories or reviews of recent periods of terrorism and in which the outcomes of different actions are presented in various ways. A common feature of these presentations is the direct comparison of different types of attacks. Although the two examples we have selected are text-based, the underlying principle would apply with even more force to more graphic visual depictions that can be found in non-text-based material. It would still be expected to apply, with less force, to verbal presentations of the outcomes of different terrorist actions (Harless 1992). First, consider this excerpt from a report appearing in the BBC in late 2017 (Corera 2017). The report was a general story about terror threat levels and included a summary of the outcomes of recent attacks:

The five attacks that got through this year included a suicide bomb attack after an Ariana Grande concert at Manchester Arena in May, killing 22.

Five people were also killed in April during an attack near the Houses of Parliament, while eight people were killed when three attackers drove a van into pedestrians on London Bridge and launched a knife attack in Borough Market.

A man then drove a van into a crowd of worshippers near a mosque in north London in June, while a homemade bomb partially exploded in a tube train at Parsons Green station last month, injuring 30 people.

Before having considered the regret research that has been discussed throughout this article, we would have read this excerpt without noticing anything in particular. Now we notice how the excerpt discusses

two attack types (bombing and vehicle attacks) and reports on the consequences of each. There are four numbers mentioned: 22, five, eight and 30. Following standard convention, the two larger numbers are typed in numerals while the two smaller numbers are typed in words. This draws attention to the two numerically expressed outcomes and makes comparison between them easier. Furthermore, in this case the two larger numbers are for the same attack type.

A different type of example can be found in the news magazine, *The Economist* (May 23 2017). The purpose of the report is to highlight the extent of terrorist activity in 2016-2017 versus earlier periods, especially 2005. In the opening segment of the report, the outcomes of two different actions are presented in a way that, once more, makes them relatively easy to compare:

ON MARCH 22nd, exactly one year after a series of suicide bombings killed 32 civilians in Brussels, a terrorist attacked central London. The British-born man drove a car along the pavement across Westminster Bridge, killing at least two people and leaving around 40 injured. He then entered the grounds of Parliament, the heart of Britain's democracy, and fatally stabbed an unarmed policeman before being shot dead. This "marauding" method of terror attack—using a vehicle to mow people down in a crowded area—was similar to atrocities carried out by Islamists last year in France and Germany. It was the deadliest terrorist attack London has suffered since the Tube and bus bombings of 2005. Many other western European countries have suffered similar jihadist attacks in the past 16 years.

Like the previous example, the larger numbers are typed in numerals while the smaller numbers are typed in words. Where this example differs from the last is that the numerals refer to two different attack types (bombing and vehicle attacks). Importantly, one of the numbers actually refers to the fatalities that accumulated from a series of suicide bombings rather than from a single bombing attack, which is a way of framing the information such that the number of victims from a bombing attack appears larger than it would if the outcomes had not been aggregated. We are not arguing that prospective terrorists read news magazines in order to gather their information about terrorism. These are just two examples to highlight a more fundamental and far-reaching point. That is, the presentation of outcomes matters and in the case of terrorist activity the potential implications of the presentation of the outcomes of alternative attack methods is something that must be considered carefully.

As research into the online dissemination of material by terrorist groups develops, attention is turning towards the question of whether this material has any discernible influence over supporters and would-be terrorist recruits. This is fundamentally a question of the ways in which this material, if it does have a discernible influence, shapes the decision-making processes as they pertain to the choice to engage in violent behaviour and the methods by which such a choice will be enacted. Even leaving aside the details of the presentation itself, the very fact that the prospective terrorist's exploits will be presented or ignored, may contribute to counterfactual thinking and anticipated regret among those prospective terrorists for whom such imagined depictions of their actions are salient. That the portrayal of the prospective terrorist's actions in these publications is indeed salient is supported by the details of particular terrorist case studies.

A primary example is that of Mohamed Merah's 2012 attacks on French Muslim soldiers and, subsequently, the Jewish school Ozar Hatorah. As Azam & Ferrero (2017) describe, Merah first attacked French Muslim soldiers. He did this on two separate occasions, both times killing the victim. He attempted to attack a third but the plan did not work out. It was then that he decided to change attack methods and headed for the Jewish school where he shot several people, including children. It was this attack

accompanied by footage filmed by Merah that attracted widespread attention from both the mainstream media and on Jihadist websites. This is despite the fact that violence perpetrated against European Jews has prompted many to migrate to Israel, in direct contradiction of the pro-Palestinian, anti-Israeli objectives of Jihadist groups. According to Azam & Ferrero (2017, p.7), "By endorsing and encouraging such actions through the implicit promise of wide publicity in the cyberspace, ISIS is trading off the harm it inflicts (at least in the short run) on the Palestinian cause by killing Jews in Europe against the fact that the latter offers the killer a much higher probability of getting instant stardom, so that allowing the killing of European Jews as an eligible Jihadist action will attract many more recruits than banning it."

V. Conclusion

Exploring regret research leads us to think about media presentation in a different way. When the outcomes of different actions can be compared easily, the choice of action may be shaped one way or the other. Potentially, a more violent action may be selected. When the outcomes of the same action are split, decision-makers will place a higher weighting on the chances that that outcome will be achieved. Event-splitting can make any terrorist action appear more attractive than it really is. Framing or presentation of the outcomes in tables, matrices or graphs may accentuate either of these two effects. The convention of writing larger numbers as numerals and smaller numbers as words is a form of framing that may sharply direct the decision-maker's attention towards particular outcomes and facilitate juxtaposition. Although it seems unrealistic to argue that media attention accorded to terrorism should be curtailed, the presentation of the outcomes of terrorism in the media may be adjusted to remove juxtaposition, event-splitting and framing effects that have the potential to shape anti-social behaviours in undesirable ways.

Regret effects can result in preferences for any of the alternatives that are available, depending on how the outcomes are presented. The predicted patterns have been systematically observed. Whether or the observed effects stem from anticipated regret or framing or some combination of both, the overarching conclusion is that the presentation of outcomes matters. In particular, the presentation of pairs of outcomes for different actions. The purpose of this paper is to highlight the relevance of this finding and the related research to the research program in terrorism studies that is encompassed under the heading 'media and terrorist'. In particular, readjusting the relative importance that has been given historically to volumes of reporting vis-à-vis the ways in which the outcomes of different terrorist actions are presented is perhaps a pathway for the further development of this research program. In conjunction with the emerging focus on social media and terrorist groups' online dissemination of material, there is scope for further development of our understanding of how this material influences the choices of prospective terrorists. If this material can influence choices, the processes by which it does so will be described by various parts of decision theory. In this paper, we hope to have made the case that counterfactual thinking and anticipated regret should not be overlooked in the search for a deeper understanding of the decision-making processes that underlie terrorist behaviour.

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