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1. THE THREAT OF TERRORISM AND HOW RISKS GENERALLY ARE NOT PERCEIVED WELL

1.1. THREAT OF TERRORISM

Mythen and Walklate (2006) noted that "despite political violence being an historically omnipresent phenomenon", there is the belief that since 9/11 a "new terrorism" has appeared "intensifying the feeling that we are living in risky times". While Goodwin et al (2005) noted that "the increasing global spread of the terrorist threat means that increasing numbers of people, previously remote from conflict areas, are now faced with threats either at home or when travelling or living overseas" (p389).

Levi et al (2010) emphasised the importance of perspective:

> On one level, a focus on terrorism seems to be a distorted priority in most countries most of the time. A Martian looking at preventable deaths and serious injuries on Planet Earth might focus more on poverty and on poorly maintained, overcrowded public transport or on domestic violence than on terrorism. And despite the growth of holidays abroad, the great majority who are not frequent international travellers might be puzzled about our obsession with the risks of planes being blown up or even of being flown into iconic buildings where mainly relatively rich people work and/or live (by contrast with attacks in London and Madrid as well as in the Middle East, Africa and Asia, which — Embassies and corporate targets apart — typically are not aimed primarily at killing and maiming elites)...
> [However] it makes a difference to most of us whether people are consciously planning to kill us (or fairly randomly to kill anyone, who might turn out to be us or people we care a lot about) or whether deaths happen "unintentionally" (even if some of these unintended deaths are the product of business or governmental carelessness) (pp617-618).

Victimisation is not equally distributed across a population. This is the prevalence (ie: amount of crime based on those who experience it) as opposed to the incidence which is the amount of crime divided by the

whole population (Brewer 2000) (figure 1.1). In other words, any crime (including terrorism) has "hot spots" in both locations and victims.

LaFree et al (2010) noted that of 73 961 terrorist attacks in 206 countries between 1970 and 2006, ten countries experienced over one-third of those (Columbia, France, India, Israel, Northern Ireland, Pakistan, Russia, Spain, Sri Lanka, Turkey) and 32 countries three-quarters. The largest increases in attacks since 1999 were in Afghanistan, Bangladesh, Indonesia, Iraq, Kashmir, Nepal, Rwanda, Soviet Union, Thailand, West Bank/Gaza, and Yugoslavia.

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        A              B              C              D
      ↑↑↑↑↑          ↑↑↑
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Arrows = crimes; letter = victim
Incidence = 8 crimes ÷ 4 = 2
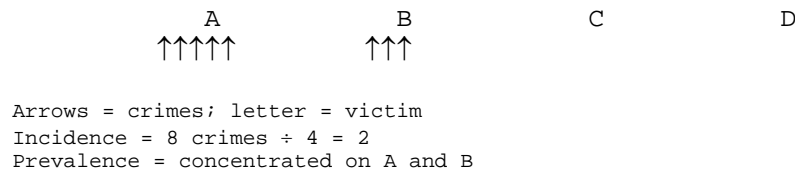Prevalence = concentrated on A and B

Figure 1.1 - Difference between prevalence and incidence of victimisation.

The problem is that "Terrorist acts, disrobe the liberal myth that the state is capable of providing order and control over its territory" (Mythen and Walklate 2006 p382).

Huddy et al (2002) reported details of the Newsday-Stony Brook random telephone survey of 1221 adults in New York in October-November 2001. This assessed the perception of personal threat and of national threat from terrorism.
Personal threat was measured by two questions:

• "How concerned are you personally about you yourself or a family member being the victim of a future terrorist attack in the United States?".
• "How worried are you that you yourself or someone in your immediate family might receive a letter in the mail at home or at work contaminated with the anthrax bacteria?".

Perception of national threat was measured by two further questions:

• "How concerned are you that there will be another major terrorist attack on US soil in the near future?".
• "How concerned are you that there will be a major terrorist attack in the US involving biological or chemical weapons?".

A large number of respondents were "very concerned"

or "somewhat concerned" to each of these question - 70%, 47.6%, 81.5%, and 80.9% respectively.

Huddy et al (2002) argued that personal and national threat were distinct, but related. For example, 69% of those perceiving a low national threat also perceived a low personal threat, while 47% of those high for national threat were also high for personal threat.

The perception of risk from terrorism will depend upon a number of factors. One of those is the core values of the individual. Schwartz (2001) described two dimensions to incorporate different types of values: openness to change - conservation, and self-transcendence - self-enhancement (table 1.1).

Openness to change
eg: stimulation (excitement, novelty, challenge in life)

Conservation
eg: tradition (respect, commitment and acceptance of customs and ideas that traditional cultures or religion provide)

Self-transcendence
eg: benevolence (preservation and enhancement of the welfare of people with whom one is in frequent contact)

Self-enhancement
eg: power (social status and prestige, dominance over people and resources)

(Source: Goodwin et al 2005 table 1 p391).

Table 1.1 - Dimensions of values described by Schwartz (2001).

Goodwin et al (2005) predicted that the "openness to change" end of the dimension is associated with riskier behaviour and therefore such individuals are less likely to perceive terrorism as a threat. "Self-transcendence" individuals are concerned for others, and they are more likely to perceive terrorism as a risk.

Goodwin et al tested these predictions about values and terrorism risk perception with a survey of one hundred central London employees [1]. Overall, perception of terrorism risk correlated with self-transcendence values.

Goodwin et al then used the same survey with 240 students in London and Oxford. A number of factors other than values were found to vary the perception of risk:

• Location - Those living in the suburbs perceived a

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[1] This research was carried out in 2003.

greater risk of terrorist attack than city-dwellers.
- Age - Older respondents perceived a greater risk than younger ones.
- Gender - Women perceived a greater risk than men.

Mean ratings of 66% and 46% of respondents were fearful of a terrorist attack in Britain in the two Good win et al studies respectively, though few of them reported changing their behaviour as a consequence of this fear (eg: 7% of central London employees used public transport less).

1.2. RISK TODAY

Risk can be viewed as having three properties (Mythen and Walklate 2006):

- Probability - how likely that it will happen.
- Uncertainty - whether it will occur or not.
- Futurity - when it will happen in the future.

Beck (1992) has introduced the idea of "risk society" to explain the individualisation of risk as a consequence of technological developments in modern capitalism (as opposed to pre-industrial society). Thus "the proliferation of an everyday culture of risk places burdensome demands upon the self, forcing individuals to habitually make reflexive choices" (Mythen and Walklate 2006 p383).

The risks under modern capitalism are not limited to a geographical area, they have greater potential for harm, and the "worst imaginable accident" reduces the ability to insurance against risk. "In industrial society, the general public pressed political parties to ensure adequate distribution of 'goods', such as income, health and housing. Conversely, in the post-needs risk society, individuals become preoccupied by protection against social 'bads', such as pollution, crime and terrorism. Since nobody craves ownership of bads, the logic of the risk society is no longer based on possession, but avoidance" (Mythen and Walklate 2006 p384).

Meanwhile, "neo-liberal institutions have sought to 'activate' individuals by making them answerable for the risks and uncertainties that crop up in everyday life.. Instead of being brought into line by direct force of the state, individuals are encouraged to become self-policing. In this way, the art of government is performed through risk-based techniques which are more oblique and benign than expressions of power in previous epochs" (Mythen and Walklate 2006 p385).

1.3. ASSESSING RISK

Assessment of risk can be based on commitment to the group that an individual belongs. Kahan (2010) called this response to scientific data, "cultural cognition" [2]: "the influence of group values - ones relating to equality as well as authority, individualism and community - on risk perceptions and related beliefs" (p296) [3].

For example, individuals with individualistic (or hierarchical) values and who value free markets tend to reject scientific data on climate change because, if it is true, it will require restrictions on industry and markets. Individuals who are less supportive of free markets (egalitarian or communitarian) are more willing to accept the data because of the blame on industry and thus the restrictions needed. In the USA, this distinction in attitudes explains differences in environmental-risk perceptions more than any other characteristic, like gender, income, or personality type (Kahan et al 2007) [4]. Wildavsky and Dake (1990) also included more than knowledge about the dangers, and said: "Wait a minute! Everyone knows that nuclear radiation and AIDS can kill. We agree. When these subjects become politicised, however, disagreement develops along the fault lines of policy differences, seizing upon whatever cracks of uncertainty now exist" (p173).

"Cultural cognition also causes people to interpret new evidence in a biased way that reinforces their predispositions. As a result, groups with opposing values often become more polarised, not less, when exposed to scientifically sound information" (Kahan 2010 p296).

For example, Kahan et al (2009) found that individual's perception of risks about nanotechnology [5] in response to neutral, balanced data on risks and benefits were based on cultural predispositions and beliefs [6].

In many cases, individuals are not able to evaluate technical data on new risks, and so look to "experts" who are perceived as showing their values. Kahan et al (2010)

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[2] Or cultural theory of risk (Douglas and Wildavsky 1982).

[3] The "cultural theory" of risk perception suggests that individuals choose what to fear and how much to fear it in relation to supporting their way of life (Douglas and Wildavsky 1982).

[4] The cultural worldview was measured by 32 items like "The government should do more to advance society's goals, even if that means limiting the freedom and choices of individuals" and "Too many people today expect society to do things for them that they should be doing for themselves".

[5] Wildavsky and Dake (1990) noted that "the great struggles over the perceived dangers of technology in our time are essentially about trust and distrust of societal institutions" (p175).

[6] The benefits greater than risks was supported by 86% of "individualistic" US online participants and only 23% of "communitarian" participants. "This finding displays the signature of 'biased assimilation and polarisation' — the tendency of persons to conform information to their predispositions and thus to become more, not less, divided when exposed to balanced information" (Kahan et al 2009 p88).

constructed arguments for and against the human-papillomavirus (HPV) vaccination against cervical cancer for 11-12 year-old girls. The arguments were attached to fictional male experts who appeared besuited (to represent individualistic values) or denim-shirted (to represent communitarian values). When the "experts" took the expected position - besuited expert against the vaccination and the denim-shirted one in favour - participants holding the same values as each expert became more polarised in their views. But when the "experts" switched arguments, polarisation of attitudes by participants declined [7] (table 1.2). The participants were an online sample of 1538 Americans.

PARTICIPANTS WITH:	INDIVIDUALISTIC VALUES	EGALITARIAN VALUES
No argument	2.38	2.22
Unattributed	3.09	2.52
Attributed: Expected	**3.27**	**2.44**
Attributed: Unexpected	*2.93*	*2.77*
Attributed: Inbetween	3.10	2.80

(Higher score = greater perceived risk)

(Bold = increased polarisation when experts argument expected way; italics = reduced polarisation when experts argue in unexpected direction)

Table 1.2 - Mean ratings of risk (out of 4) in each condition.

So it becomes a question of communicating risk and solutions in a way that appeals to the values of a group rather than challenges them. For example, emphasising solutions to climate change that do not appear to restrict free markets will appeal to individuals with individualistic values. While individuals with communitarian values will respond better to solutions that emphasise equality (Kahan 2010).
    Cohen et al (2007) found that in four experiments, contrary to common sense, open-mindedness is encouraged by getting individuals to concentrate upon their values and not on compromise (appendix 1A).

1.4. RISK PERCEPTION AND APOCALYPSE

    The perception of risk generally takes place in the

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[7] The conditions were "no argument", "unattributed arguments" (no authors attached to information), "culturally identifiable advocates" - expected, unexpected, or inbetween.

context of a feeling for many in the West of being on the edge of an apocalypse. The collapse of civilisation is very close as we are on the brink, so it is felt. There are a number of factors that together could account for such feelings.

i) A greater awareness of risk - Greater knowledge about the world, both in terms of science and internationally, has increased the perceived number of risks to life. For example, improvements in telescopes has widened the knowledge about the solar system, but also made individuals aware of the vulnerability from comets and asteroids hitting the Earth. While the globalisation of the world and media means that dangers from across the world are happening now in our living rooms. There can be such a thing as blissful ignorance.

ii) A belief that risks should be zero or close to it - Life in the West is relatively safe and secure for the majority compared to other parts of the world today, and to the world generally in the past. Such security has produced a mentality that risks should be minimised, if not completely controlled, and made non-existent.
In one sense, there is no such thing as an accident because somebody (which includes "authority figures") should be have assessed the risk to stop such a thing from happening [8].

iii) Less tolerance for problems due to increased expectations - Together with the previous point, perceptions of what is acceptable has changed. One of which is that accidents are not acceptable.

iv) "Living on the edge" - Individuals can feel this in terms of struggling to keep up with technological developments or the pressure of marketing about the latest products. There is a feeling that the world is speeding by - the pace of change is so fast.
"Living on the edge" is also present with retail businesses using "just in time" models and keeping little stock. Rather than holding a large amount of stock which costs money, it is better to call for a delivery from the

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[8] This is an example of the "hindsight bias" where current knowledge is used to assume that it was obvious before the event that something was going to happen. It assumes omnipotence in one sense. Add to this the idea of "blame culture" (ie: someone should been responsible for the event). There is an ambivalence, however, in relation the government being responsible. Often the blame is placed upon the government or its officials for should of having known and stopped it happening, but an antagonism towards the government putting measures into place to stop such an event. Then individuals talk about their freedom of choice and are critical of a "nanny state". For example, if there is a terrorist attack, the government is blamed for not stopping it, by arresting the perpetrators, but there is an unwillingness to live in a society where a government has such surveillance powers to stop an attack beforehand. Ambivalence or contradiction is a key characteristic of "post-modern" society, for me.

suppliers/wholesalers. This is fine if demand is relatively constant or predictable, but a sudden, unexpected surge and the shops are empty.

Taking a simple example, an electrical retailer stocks a small number of fans, and then there is a heatwave. The stock goes quickly, but there is a time lag before the next delivery. Thus a shortage appears. With a limited amount of slack in the system, there can be a feeling that civilisation is close to the brink when the unexpected happens. Pushing "just in time" to the extreme, it only takes one late delivery to produce this feeling.

In terms of the reality of an apocalypse, the "Scientific American" magazine in September 2010 listed eight possible apocalypses and their likelihood of happening from "killer pandemic" (odds: one in two in next thirty years) to "super-volcano" (one in 100 in next 1100 years), "giant asteroid impact" (one in one million in the next 100 years), and "bubble nucleation" (where another universe spontaneously pops up within this one) (one in one billion in the next one trillion years). The probabilities are "not scientific facts - an impossible goal when estimating the possibility of unprecedented events - but informed conjecture based on researchers' expert opinions" (Matson 2010).

1.5. APPENDIX 1A - COHEN ET AL (2007)

Pilot Study

Individuals in the USA supportive of US foreign policy after September 11th 2001 ("patriots") and those not supportive ("anti-patriots") were recruited for the pilot study. Two independent variables were manipulated in the study. The first involved participants writing a short essay about their personal values (self-affirmation) or failings (threat). Then they read a report critical of US foreign policy presented by a "patriotic" experimenter (with a US flag pin on lapel) or a neutral one (in a white laboratory coat). Not surprisingly, the "patriots" evaluated the report more negatively than "anti-patriots", except in the conditions with the "patriotic" experimenter and the self-affirmation essay (1 and 3 in table 1.3) where there was no difference.
It was felt that the self-affirmation essay for "patriotic" participants helped them cope with challenges to their political beliefs, and thereby encouraged open-mindedness.

Participants:	Patriotic Self-Affirmation	Patriotic Threat	Anti Self-Affirmation	Anti Threat
Patriotic experimenter	1	2	3	4
Neutral experimenter	5	6	7	8

Table 1.3 - Eight conditions in pilot study.

Study 1

Only "patriotic" participants (n = 43) were used in this replication of the pilot study. Firstly, they performed a task that affirmed or threatened their self-esteem, then read a report positive towards terrorism attributed to a critic of US foreign policy while being encouraged to think about patriotism or about being rational (table 1.4). The dependent variable was the openness to the report based on a nine-point scale.

	SELF-AFFIRMATION TASK	THREATENING TASK
THINK PATRIOTIC	1	2
THINK RATIONAL	3	4

Table 1.4 - Four conditions of Study 1.

Participants were more open to the report in condition 1 in table (think about patriotism/self-affirmation) (mean = 6.40) than in condition 2 (mean = 5.22). There was no difference between conditions 3 and 4. This study showed that self-affirmation increased openness to a counter-attitudinal communication when a relevant value is made salient (ie: patriotism).

Study 2

This study tested whether self-affirmation encouraged openness to counter-attitudinal information in another situation. In this case, 35 students self-rated as "pro-choice" [9] in relation to abortion were recruited. In the first part of the experiment, they wrote an essay about their personal values (affirming) or failings (threatening). Then they took part in a negotiation over a bill about abortion while role-playing as Democratic

[9] In favour of abortion.

politicians with a confederate as a Republican (table 1.5) [10]. The confederate put forward the counter-attitudinal information. Half the participants were asked to concentrate on their beliefs during the negotiation (conviction salience) and half were asked to concentrate on the negotiation process (conviction non-salience). A post-experiment questionnaire was used to measure willingness to concede to arguments put forward by the confederate. There were four independent conditions again.

- Your state currently has fairly liberal abortion laws with few restrictions in place. However, a new bill, the Abortion Control Act, which would place a number of restrictions on abortions performed in the state, has recently been considered in the state legislature. This bill has passed in both the State Senate and the General Assembly, but each house passed a somewhat different version of the bill. You and the other participant are part of a conference committee convened to resolve the differences between the two versions of the bill. Together, you must try to agree on a final version of the bill, which will then be put to a final vote in both houses of the legislature.

- If you fail to reach a complete agreement, that means that your conference committee will be dissolved, and the bill will be sent to an entirely new conference committee. Given the makeup of the current legislature, this new conference committee is likely (although not certain) to be rather conservative and, therefore, to agree on a bill that is restrictive vis-a-vis abortion access and thereby unfavourable to the pro-choice position (Cohen et al 2007 pp422-423).

Table 1.5 - Role-playing scenario given to participants.

The participants in the self-affirming/conviction salience condition were significantly more willing to make concessions than the threat/conviction salience condition (mean 7.43 versus 3.94, where a higher score is greater willing to concede; $p = 0.003$). There was no significant difference between the other two conditions. "In the convictions salient condition, affirmed participants found it easier, or at least less disagreeable, to compromise on their initial demands than did the participants who were threatened" (Cohen et al 2007 p424).

Study 3

This study used a similar scenario as Study 2 with 39 more "pro-choice" undergraduates. Essay writing was

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[10] Traditionally in the USA, Democrats are "pro-choice" in the abortion debate and Republicans are "pro-life".

used to establish affirmation or threat. Before the negotiation role-playing, participants were asked to think about winning the negotiation (partisan commitment) [11] or about compromise [12].

In the partisan commitment conditions, participants with self-affirmation were willing to make more concessions than the threat condition (a sign of open-mindedness). But in the compromise conditions, self-affirmation produced less concessions than the threat condition (a sign of close-mindedness).

Practically, these experiments showed that individuals were more willing to compromise or to be open to counter-attitudinal information if they felt positive about themselves (self-affirmation) and were encouraged to focus upon their values. In fact, Study 3 showed that concentrating on compromise beforehand produced less actual compromise in the negotiation.

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[11] "When you are preparing to engage in a negotiation like this one, it is important to take some time to think about your position and what matters to you. We find that people who do best in situations like this are those who can stand up for what they believe in and think is important" (Cohen et al 2007 p425).

[12] "When you are preparing to engage in a negotiation like this one, it is important to take some time to think about what matters to the other party and how you can come up with a compromise solution that will work reasonably well for both of you. We find that people who do best in situations like this one are those who can adopt the other party's perspective and make reasonable compromises when necessary" (Cohen et al 2007 p425).

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2. TWO THEORIES ON THE EVOLUTION OF LEADERSHIP AND FOLLOWERSHIP IN HUMAN GROUPS

2.1. INTRODUCTION

Early research on leadership concentrated on the characteristics that distinguished leaders from non-leaders (known as the trait approach). Later research concentrated on leadership styles in the light of the situation and the followers' needs (known as the situational or state approach) (Bass 1990). Put simply, the issues can be divided into "born leaders" versus the emergence of leaders in particular situations.

"It seems that whenever a group of people come together, a leader-follower relationship naturally develops. This has led various experts to conclude that leadership is a universal human behaviour" (Van Vugt 2006 p354).

2.2. EVOLUTION OF LEADERSHIP

Leadership can defined as "a process of influence to attain mutual goals", and cannot be studied without reference to the followers (Van Vugt 2006). In evolutionary terms [13], the goals are adaptive problems to be resolved, like when to leave one area to forage for food elsewhere. There are safety benefits in staying together when moving. So the group decision of when and where to move to is improved by the emergence of an individual who leads on both these issues.

Evolutionary theory gains support from the universality of behaviour across cultures, and across time. As much as can be ascertained, early human hunter-gatherer groups had a "Big Man" (eg: physically strong individual) who influenced the group (Van Vugt 2006).

Other social species show something similar. For example, among baboons, an older male takes a few steps in one direction and the others in the troop follow, and

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[13] From an evolutionary point of view, passing genes into the next generation is key. This done by mating, and staying alive in between (ie: getting food and not getting eaten). Any behaviour that aids this process (directly or indirectly) is seen as having evolutionary benefits.

that is how the troop moves to another area to forage (Dunbar 1983). Usually it is an "alpha male".

While for elephants, individuals with the least to lose from the herd splitting succeed in moving the herd in their direction. These individuals are female, and males loose mating opportunities. Thus females are leaders of the herd (In Brief 2009).

In terms of the evolutionary advantages of being a leader, they include access to resources and greater reproductive success. In traditional societies, men in leadership positions have more children than the average in that society (Betzig 1986). So, in evolutionary terms, everybody would want to be a leader. But this is not possible. What are the evolutionary benefits of following?

Good leaders, however, enhance the benefits for the whole group (eg: finding more food), and this could be an indirect evolutionary benefit to following (Van Vugt 2006).

2.3. EVOLUTIONARY THEORIES

Van Vugt (2006) presented two evolutionary explanations of leadership which can be seen as the by-product dominance theory, and a theory of social co-ordination.

2.3.1. The By-Product Dominance Theory

Leadership is a by-product of the relative position of individuals in the dominance hierarchy. In other words, the "alpha male" (or female) is able to influence and control the group because of their position at the top, and subordinate individuals are forced to follow because of this situation. thus the dominant individuals are always the leaders.

However, in research on leadership, there is no consistent positive correlation between dominance as a personality trait and becoming a leader. In fact, followers prefer a leader who is not dominant (eg: authoritarian) (Van Vugt 2006).

2.3.2. Theory of Social Co-ordination

This is the idea that leadership evolved to solve the problem of co-ordinating the group (ie: to foster collective action and group cohesion). For example, a small group need to move to another island to find food. They can build a boat or a bridge, but each activity requires all the members to help. Without co-ordination,

some individuals will build a bridge and some a boat, and neither will succeed. The group wastes energy and becomes hungrier. A leader co-ordinates the building of a boat, say, by everybody, and all of them benefit from food on the other island (Van Vugt 2006). Thus followership developed as a complementary strategy to the evolution of leadership here.

Applying evolutionary game theory (Maynard Smith 1982), the best strategy for two players, for example, is one leader and one follower rather than both following or both leading (figure 2.1). Though leaders gain more than followers in the first strategy, the followers gain more than the alternatives. The leader/follow is the "equilibria of the game" or "evolutionary stable strategy" (ie: best for both parties).


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                         PLAYER B

                    FOLLOW            LEAD
PLAYER A
          FOLLOW    0\0               1\2
          LEAD      2\1               -1\-1
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(Source: Van Vogt 2006)

Figure 2.1 - Pay-offs for each player according to game theory.

It can be predicted that leaders will have the abilities to co-ordinate the group. Research on leaders supports this. For example, in business, leaders differ from ordinary employees in traits like extraversion, self-confidence, good communication, and social intelligence (Van Vugt 2006).

Van Vugt (2006) summarised the predictions that emerge from the social co-ordination theory of leadership:

- Individuals inclined to take the initiative are more likely to become leaders.

- Individuals quicker to recognise a situation as a co-ordination problem are more likely to become leaders.

- Individuals with unique abilities that help to accomplish group goals are more likely to become leaders.

- Individuals who are generous and fair to followers are more likely to succeed as leaders. There are more evolutionary benefits in being a leader than a follower, so the leader needs to make sure it is

worthwhile for the followers to follow (eg: sharing food).

- Leaders will only emerge in situations requiring co-ordination.

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3. NEGATIVE CALORIE ILLUSION

3.1. INTRODUCTION

Human cognitive processes and decision-making are often modelled as objective, logical, and rational. Yet the reality is far from so. For example, attribution theories describe how individuals weigh up the evidence before deciding if the cause of an individual's behaviour is dispositional or situational. While research on attributional biases show that heuristics/short-cuts are used which over- or under-estimate certain factors. The fundamental attribution error, for example, over-estimates the cause as dispositional (ie: something about the individual).

Similar short-cuts distort decision-making and perception in relation to food and weight gain. For example, "people behave as though healthy foods - such as fruits and vegetables — have 'halos' that extend to all aspects of the meal, including its effect on weight gain. Because healthier meals are perceived to be less likely to promote weight gain, people erroneously assume that adding a healthy item to a meal decreases its potential to promote weight gain" (Chernev 2010a p1).

Put simply, adding a healthy option, like a side salad, to an unhealthy meal is perceived as reducing the calorie content of the whole meal as compared to the same meal without the side salad. This bias is even stronger for individuals concerned with managing their weight. Chernev (2010a) called it "the dieter's paradox" (or "negative calorie illusion"), and showed it existence experimentally.

3.2. CHERNEV (2010a)

Chernev (2010a) recruited 934 US online participants. They were shown four unhealthy meals, and asked to estimate the calorie content of each meal. Half the respondents were shown the meals (control condition), and half saw the meal with a healthy option added (experimental condition) (table 3.1).

The average estimate for the unhealthy meal was 691 calories (control condition), but the estimate was significantly lower with the added healthy option (experimental condition) (average: 648 calories). This

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MEAL                              ADDED HEALTHY OPTION

1. Hamburger                      Three celery sticks
2. Bacon-and-cheese waffle sandwich Small organic apple
3. Chilli with beef               Small salad without dressing
4. Meatball pepperoni cheesesteak  celery/carrot side dish
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Table 3.1 - Meals used in experiment.

was a decrease of 6.2% for perceived calorie content when the healthy option added. "This bias was observed in all four meals tested, indicating the prevalence of the belief that one can consume fewer calories by simply adding a healthy item to a meal" (Chernev 2010a p3).

    For individuals who reported themselves as weight-conscious the effect was stronger - a 13.5% decrease with the healthy option as opposed to 3.8% for individuals not weight-conscious (table 3.2; figure 3.1).

	CONTROL CONDITION	EXPERIMENTAL CONDITION
Overall	691	648
Weight-conscious individuals	711	615
Not weight-conscious	684	658

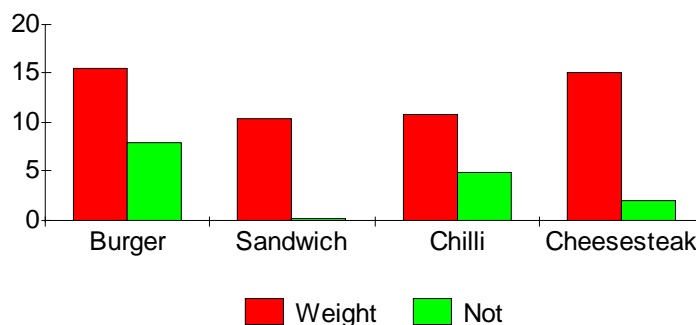Table 3.1 - Average estimates of calorie content of meals.

Figure 3.2 - Average negative calorie illusion (ie: % decrease in calorie content of meal with added healthy option) for individuals who are weight-conscious or not for each meal.

    Chernev (2010a) explained the negative calorie illusion based on how individuals categorise foods into "virtues" and vices". Thus adding a virtue to a vice is perceived as reducing the overall calorie content of the

meal.

In other research, Chernev (2010b) found that vice food is perceived as having more calories if eaten after a virtue food than after another vice food.

3.3. REFERENCES

Chernev, A (2010a) The dieter's paradox Journal of Consumer Psychology (In press) (http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B8JGB-5120CJR-1&_user=10&_coverDate=09%2F18%2F2010&_rdoc=1&_fmt=high&_orig=search&_origin=search&_sort=d&_docanchor=&view=c&_rerunOrigin=scholar.google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=7f1e135ade4bd537bf895e7807d15836&searchtype=a#FCANote)

Chernev, A (2010b) Semantic anchoring in sequential evaluation of vices and virtues Journal of Consumer Research (In press) (http://archive.constantcontact.com/fs054/1102814513565/archive/1103827731780.html)