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Exploring the psychology of trade-off decision-making in environmental impact assessment

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Exploring the psychology of trade-off decision-making in environmental impact assessment

Abstract

Dealing with trade-offs lies at the heart of environmental impact assessment (EIA). However, there has been scant reflection to date on the concept of trade-offs within the EIA literature. This paper aims to contribute to the thinking about trade-offs by distilling key learning points from research conducted within the field of psychology. In particular the paper explores three interrelated questions namely: 'When are trade-off decisions difficult?'; 'How do we react when faced with difficult trade-off decisions?' and 'How can we deal with difficult trade-off decisions?' The research confirms that EIA functions within a very difficult trade-off decision-making context and that observed behavior related to these difficult decisions can be explained from a psychology perspective. In order to deal better with trade-off decisions it is helpful to be able to predict decision difficulty and anticipate resultant behavior. Moreover, the way we present and frame decisions affect their outcomes.

Key words: environmental impact assessment, trade-offs, decision-making, conflict in decision-making, psychology

1. Introduction

Dealing with trade-offs in decision-making is one of the more important and at the same time lesser explored concepts in environmental impact assessment (EIA)¹. Our literature review suggests that the discussion of trade-offs in impact assessment was first introduced in the late 1990s, with explicit discussion found in Sadler (1996), Glasson (1999), Weston (2000) and Wood (2003). More recent contributions have been made by authors engaged with sustainability assessment, including Gibson et al (2005), Gibson (2006) and Morrison-Saunders and Pope (2013), since the concept of sustainability brings into focus the difficult trade-offs faced by EIA decision-makers between competing objectives. From an EIA perspective, dealing with, and thinking about trade-offs, warrants a sound understanding of how decision-making works. Therefore we explore the broader psychology literature which has a long history of general decision-making research but also research specifically dealing with trade-offs. In our literature search we came across a publication entitled 'Conflict and Trade-offs in Decision-making' edited by Weber et al (2011). On our first reading of the book three questions emerged that are being addressed in psychology and which are particularly relevant to dealing with trade-offs in EIA, namely:

- *When are trade-off decisions difficult?* This question is particularly considered in the published work on prediction of trade-off decision difficulty. This could typically be the first point of reflection for impact assessment practitioners, which allows them to anticipate difficulty in dealing with particular trade-off decisions.
- *How do we react when faced with difficult trade-off decisions?* This question is considered in research on behavior prediction which aims to understand decision-maker behavior related to difficult trade-off decisions.
- *How can we deal with difficult trade-off decisions?* The psychology research also provides pointers and solutions on how to deal with difficult trade-off decisions. Although there is not a single magic silver bullet we intend to introduce new thinking towards finding solutions to dealing with trade-offs that we believe will be useful to impact assessment practitioners.

¹ We use the term EIA in a generic sense as an umbrella term encapsulating any form of 'impact assessment' and/or 'environmental assessment'

We further conceptualized these three questions by highlighting the relation between them as illustrated in Figure 1. Using the questions as the basis for a conceptual framework we explored the psychology literature in more depth by following the literature trail initially provided by Weber et al (2011), with a view to distill key learning from psychology to inform thinking about and dealing with trade-off decision-making in EIA – which is the main aim of this paper.

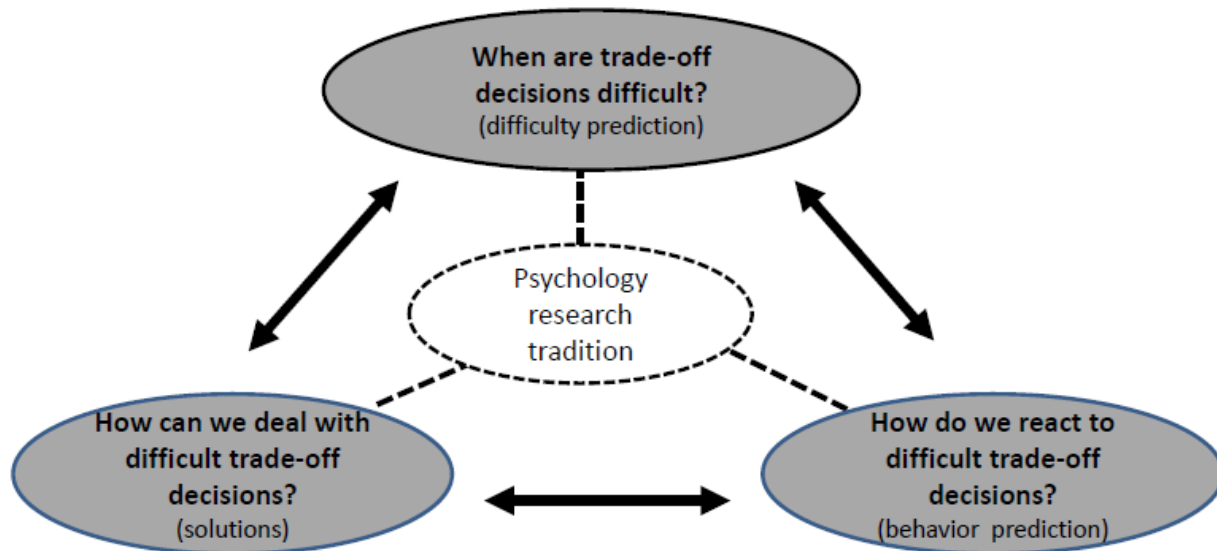


Figure 1: Key research questions within psychology related to trade-off decision-making

At the outset, our search for answers to the three questions reveals that the consideration and management of trade-offs in decision-making is a key issue not just for EIA but for the broader area of decision-making, which in turn is a subject of intense interest and research in many disciplines. As Kahneman and Tversky (1984, p341) observe:

Making decisions is like speaking prose—people do it all the time, knowingly or unknowingly. It is hardly surprising, then, that the topic of decision-making is shared by many disciplines, from mathematics and statistics, through economics and political science, to sociology and psychology.

These various bodies of research and practice offer rich insights into the nature of decision-making and trade-offs, and can potentially be mined for the benefit of EIA researchers and practitioners. The potential for cross-pollination of this kind is already recognised within the EIA community, which has often drawn upon the related fields of planning, policy analysis and

political science in the interests of theory-building (e.g. Bartlett and Kurian 1999, Lawrence 2000, Nitz and Brown 2001). The links between EIA and these other fields are strong and can be traced back to the earliest days of impact assessment, since Lynton Caldwell - widely considered as the father of impact assessment and the person who in the late 1960s introduced EIA in the United States - was a political scientist.

These fields themselves are by nature multidisciplinary: for example, the very early contributors to the study of public policy and administration drew upon psychology to highlight the implications of cognitive limitations for decision-making. Resultant concepts such as 'satisficing' (Simon 1956), 'bounded rationality' (Simon 1957) and 'successive limited comparisons' (Lindblom 1959) have subsequently been introduced to the field of impact assessment by a number of contributors, including Kørnøv and Thissen (2000) and Nilsson and Dalkmann (2001), particularly in the context of strategic environmental assessment (SEA) and an exploration of the influence of SEA on planning and decision-making processes.

This paper follows the tradition of exploring beyond the established boundaries of EIA for insights, but has a specific focus in terms of the field upon which we draw, which in turn has implications for the aspects of impact assessment with which we are concerned. Research on trade-off decision-making has been a particular focus of the psychology research tradition for a long time (e.g. Lewin, 1951; Edwards, 1954; Atkinson, 1964; Baron, 1986; Schwartz, 1986). However, Baron and Weber (2011) distinguish between research approaches firmly within the psychology tradition (for example Lewin, 1951) and research based on the infusion of economic thinking and psychology (for example Edwards, 1954). These two approaches have developed as parallel fields since the 1950s, with the first characterised by more qualitative methodologies (in the psychology tradition), while the second ventured into more quantitative and practice based research, making the link between theory and real world decision-making. The practical nature of the latter approach makes it particularly relevant to EIA. We found the work which evolved at the juncture of economics and cognitive psychology and which aims to "explain and predict decision-making behavior, whether such behavior appears to be rational or irrational" (Baron and Weber 2011, p5), to be particularly relevant to our consideration of trade-offs in decision-making.

The relationship between economic theory and psychology in the context of decision-making was first explored by Ward Edwards (1954). Simply put, whereas classic economic theory

argues that action maximizes utility, psychology argues that the decision maker decides between options and chooses the option which is better than the status quo (Edwards and Tversky 1967). Simon (1959) highlights the different assumptions about the decision-making context that underpin these two models: whereas the 'economic man' is perceived to have unlimited cognitive ability and to operate in a stable environment in which goals are clearly defined and perfect information is available, and hence the decision-maker's personal attributes are irrelevant, the alternative view acknowledges that in reality decision-making contexts are complex and unstable and that different individuals will perceive and interpret this environment differently, as well as having different information-processing abilities. Hence from a psychological perspective it is important to understand both the perceptual and the cognitive characteristics of the decision-maker. Simon (1985) later distinguishes between 'substantive' or 'objective' rationality focused on outcomes, which is the domain of economics, with 'procedural' or 'bounded' rationality focused on the processes by which an individual makes decisions, which is the domain of cognitive psychology.

The psychology research is typically concerned with decisions being made by a single individual according to their own interests. Although we recognise that EIA is a process comprised of innumerable inter-related decisions (Weston 2000), many of which are not discreet and are made collectively and iteratively through processes including negotiation, bargaining or learning (Kørnøv and Thissen 2000, Deelstra et al 2003, Hilden et al 2004, Nitz and Brown 2001), we believe there is still much that this field can contribute to EIA. This is particularly so when considering the discrete decision points in the planning and approvals process, which are the responsibility of an individual or at least a particular entity such as a panel or committee. Examples of such decision points include the final approval decision, where responsibility typically falls to an authority figure such as a Minister for Environment, and the point of approval of a preferred development option by a senior manager or Board of a proponent organisation prior to the commencement of the formal EIA process.

It is in the context of these decision points that the substantive trade-offs (Morrison-Saunders and Pope 2013), with which we are chiefly concerned here, come into focus. It is true, however, that such authority figures are acting not on behalf of themselves but on behalf of the broader community and a range of stakeholders, including political masters in the case of a Minister, or on behalf of the organisation and its shareholders in the case of a proponent decision-maker. Moreover, individual decision makers also typically function within committee structures which

require joint decision-making. While we must therefore be cautious in transferring learnings from psychology directly to EIA, it can also be argued that any differences or tension between personal and organisational goals, as well as the complexities of political or organisational decision-making are simply part of the decision-making environment within which the individual or entity operates (Simon et al 1987), and therefore are relevant to the psychology research we draw upon here.

The following sections set out to answer the three key questions introduced earlier through a literature review of the psychology research tradition. We do not claim to offer conclusive solutions or specific recommendations but rather to introduce impact assessment researchers and practitioners to a body of knowledge from another field and invite them to explore further its potential implications for our work.

2. When are trade-off decisions difficult?

This section explores research on predicting how difficult a particular decision is to make. The first section introduces so-called 'predictors of decision difficulty' and the second focuses in more depth on the role of values as a particularly important consideration in predicting difficulty.

2.1 Predictors of decision difficulty

Three types of decision difficulty are described by Frisch (2011), based on work by Beattie (1988) and Lopes (1990). The first difficulty is to decide what to believe on the basis of conflicting evidence; the second is the challenge of making trade-offs between competing goals; while the third deals with decision-making under conditions of uncertainty. In each three of these areas, the research reveals that people's judgment and decisions deviate from so-called models of rational behavior (e.g. Frisch, 2011). Moreover, research reported by Beattie and Barlas (2011) which builds on earlier research (e.g. Shepard, 1964; Foa and Foa, 1974; Schwartz, 1986; Beattie 1988; Beattie et al, 1994) classifies a number of predictors of trade-off decision difficulty, namely:

- *Level of certainty*: In a decision-making context where there is a prevailing high level of uncertainty decision-making becomes more difficult.

- *Concern over the outcome*: The less a decision-maker cares about the outcome the easier the trade-off decision.
- *Similarity between alternatives*: The more similar the options or alternatives, the easier the trade-off decision. This could be expected because it is also typically true that the more similar the options or alternatives, the less important it becomes which one gets chosen.
- *Morality*: If there is strong moral conviction related to a particular alternative then trade-off decision-making becomes easier. The moral basis for decisions is sometimes translated into so-called decision rules, which guide decision-making.
- *Commodities, currencies and non-commodities*: Decisions concerning trade-offs between non-commodities² are more difficult and takes longer than those considering commodities³ and currencies⁴. Policy makers in particular, shy away from making trade-off decisions about non-commodities, and reflect a particular decision aversion in these cases (Beattie et al 1993).

We briefly expand on each of these predictors with additional considerations in light of EIA practice.

The first predictor relates to the level of certainty a decision-maker feels about making the right trade-off decision, which in turn relates to the types of decision conflict (i.e. dealing with conflicting evidence and uncertainty) described above but also to a large extent to the capacity and experience of the decision maker. With respect to uncertainty it is interesting that Zeelenberg et al (2000, p535) report that: "people perceive unexpected negative outcomes as more aversive than expected negative outcomes", which is consistent with the view that reducing uncertainty in EIA is highly desirable so as to minimise the likelihood of unexpected negative outcomes. It could be argued that experienced and well capacitated decision makers experience less conflict when dealing with trade-offs because they are more confident in making the right decisions. In contexts where EIA regulators are inexperienced and poorly capacitated (such as various developing countries) this likely leads to high levels of decision conflict and a particular difficulty in dealing with trade-offs. Inexperience might also be associated with emotional difficulty which leads to decision aversion. Moreover, the fear of subsequent regret of

² Objects that either cannot be transferred (e.g. pain) or lose some of their value by being traded in markets (e.g. friendship).

³ Objects that are appropriately bought and sold in markets.

⁴ Objects that act as stand-ins for commodities (e.g. money).

making the wrong decision also explains why decision makers would delay decisions or request more information frustrating the assessment process.

The level of concern over the outcome of the decision also determines trade-off decision difficulty. In the case of regulated impact assessment this becomes a complex picture. The level of concern over the outcome will differ between different role players (i.e. proponent, regulator, assessment practitioner, interested and affected parties). It could be argued that proponents and interested and affected parties are most concerned about the outcome followed by regulators. The concern over the outcome for assessment practitioners will vary depending whether they work for the proponent or the regulator. Regulators are concerned mainly within the context of their mandate to make decisions and to ensure that they operate within their mandate. As Simon et al (1987, p27) point out: "When people assume organizational positions they adapt their goals to their responsibilities". Assessment practitioners or consultants should generally provide an objective professional outcome and in some jurisdictions they are even by law required to operate independently from the proponent (e.g. South Africa) – with theoretically little concern for the outcome. Therefore in relation to this particular predictor of decision difficulty proponents and their consultants together with interested and affected parties should experience most decision conflict followed by regulators and consultants.

The level of similarity between options or alternatives as a predictor of decision difficulty has particular resonance with impact assessment because the consideration of alternatives lies at the heart of the process. The decision-making sciences suggest that the more different the alternatives the more difficult the trade-off decision (e.g. Houston and Doan 1996; Fiske and Tetlock 1997). This means that one of the fundamental objectives of impact assessment and especially sustainability assessment, which is to consider as widely as possible new ways of thinking and doing, will inevitably inject high levels of decision difficulty. However, in most EIA cases the alternatives to be compared are rather similar (e.g., different road alignments rather than, say, selecting between new road and railways, or introducing congestion charges for road traffic), given that the studies are conducted by the project proponent. This should limit the extent to which different types of impacts need to be traded-off.

Considering morality as the fourth predictor of decision difficulty is perhaps more of a theoretical discussion, but nevertheless a very important one. The research suggests that a strong moral basis for decision-making makes it easier to make a decision (Beattie, 1988), while Krosch et al

(2012, p224) state that: "morally challenging decisions tend to be perceived as difficult by decision makers". It seems to us that in impact assessment attempts have been made to translate morality into so-called 'trade-off decision-making rules' (see Gibson, 2006) or principles to guide decision-making. Moral decisions are those decisions based on moral conviction devoid of personal interest or emotions. Many of the difficulties in dealing with trade-offs could be linked to this lack of moral agreement on what is the right thing to do for society as a whole not considering personal interests or preferences. Difficulty with dealing with trade-offs in impact assessment can be viewed as a morality clash between the interests of different stakeholders such as the proponent, consultants and government.

Decisions involving trade-offs between non-commodities are the most difficult, an observation that is particularly relevant in the context of environmental and sustainability decision-making where environmental values are usually non-commodified. This is why predictive models and technologies for decision-making often translate non-commodities to currency and/or commodities (i.e. tradable goods). Examples exist where environmental goods and services have been translated into currency and commodities for example the work done on the monetary value of ecosystem services (Costanza, et al 1997). The latter is an attempt to translate non-commodities to currency in order to make it easier for decision makers to consider trade-offs, and this makes sense from a purely decision-making perspective. However, Schwartz (1986) refers to the confusion this integration of market considerations with social and moral considerations causes as a kind of 'economic imperialism'. He further argues that once a particular item has become viewed by society as an economic good (commodity) then it is no longer possible for people to treat it as a non-commodity. Therefore, although the translation of non-commodities might be possible in some instances, impact assessments are fundamentally and continually expected to consider trade-offs between non-commodities. Unfortunately the decision-making sciences do not have clear solutions on how to deal effectively with non-commodity trade-offs. As Beattie and Barlas (2011, p62) state, "We wish to question whether the same technologies used for commodities and currencies should also be extended to non-commodities, or whether we should look for new technologies to aid people to make what is potentially difficult and painful decisions."

2.2 The role of values in trade-off decision-making

In the previous section, moral issues were identified as a contributing factor to trade-off decision-making difficulty. Closely related to this is the consideration of the role of values and emotions in trade-off decision-making (e.g. Baron and Spranca 1997), and 'taboo trade-offs', to use the term coined by Fiske and Tetlock (1997). Baron and Spranca (1997) discuss 'protected values', defining them as those that resist trade-offs with other values, and they note that people will express strong emotions, especially anger, at the thought of even making such trade-offs. They further suggest that protected values are a subset of moral values, and this explains why it would be 'taboo' to trade these off. It is little surprise to learn then that such trade-offs illicit a strong reaction by decision-makers such as outright denial (e.g. Baron and Spranca 1997) or blame deflection, procrastination, obfuscation and avoidance (e.g. Fiske and Tetlock 1997, Anderson 2003), a topic we return to in the following section.

Fiske and Tetlock (1997) define four values systems within which decisions are made and social relations are carried out; these also approximately align with different political party ideologies (a similar link between personal values and political alliances is made by Lakoff 2004). The four values systems occur in a spectrum. To the definitions derived from Fiske and Tetlock (1997) that follow, we have added EIA related examples that we believe are relevant to each system:

- Communal sharing value system – whereby everyone in the community gets an equal share of resources or involvement in processes. For example environmental resources such as clean air or national parks are to be shared by all. This is probably also where inter-generational considerations would fit, simply that there is an understanding that future generations should inherit high quality environmental resources (but no specifics beyond that general principle).
- Authority ranking value system – whereby hierarchies apply such that some things or persons obtain more authority than others (this may include positive discrimination to give priority to minorities as per expectations for intra-generational equity). The need to account for differences in power in EIA activities such as public participation is well established and special resources (e.g. highly valued heritage or conservation sites or threatened species) may automatically trigger EIAs and require special attention if they are to be affected by development proposals.
- Equality matching value system – which is based around a tit-for-tat exchange in which equivalent resources are exchanged in order to maintain an even score. This would appear to be an underlying principle for rehabilitation and environmental offsets (e.g.

like-for-like ecological compensation) with respect to ensuring maintenance of natural and social capital.

- Market pricing value system – in which a unit of measurement (e.g. monetary values) is assigned so that meaningful ratios between alternatives can be determined; for example, the use of cost-benefit analysis in EIA and other forms of decision-making.

Each of the four values systems are used by people all the time unquestioningly; social norms or shared values are all that are needed to make choices or trade-offs within any one system. There are no 'rules' to guide how decisions are made within each system, rather this is just assumed or understood wherever people have shared values (e.g. as is the case within political parties).

Problems arise, however, when decision-makers or stakeholders involved in a particular decision subscribe to different values systems, and this is exacerbated as the span across the spectrum becomes greater. For example, the notion of putting a market price on clean air and thus converting it to a commodity will sound bizarre, impossible or outright offensive to many people, and a committee or panel charged with making a decision or recommendation in the context of EIA may include individuals spanning this divide. Similarly decision-makers may hold different value positions to the proponents or EIA professionals presenting the information and this may affect the decisions they make. We noted previously that commodities are easy to trade but non-commodities (i.e. social or environmental features) are difficult. As Fiske and Tetlock (1997, p273) state: "It is gauche, embarrassing, or offensive to make explicit trade-offs among the concurrently operative relational mode". With respect to the conceptual framework for trade-offs put forward by Morrison-Saunders and Pope (2013), trade-offs between economic, social and environmental categories will frequently, if not always, engender comparisons between value systems and thereby invite controversy. Baron and Spranca (1997) note that in such circumstances people become concerned about their participation in the process not just with the outcome. It is not surprising therefore that strong emotions are associated with values-based or moral trade-offs.

In short, to make a trade-off requires some common scale or basis for comparison for comparing the alternatives. Decision-making within a single value system is obvious and does not need to be explained because social norms prevail. Major problems loom however

whenever there is cross-over between two systems, with significant effects on decision-makers that we address in the next section.

3. How do we react to difficult trade-off decisions?

Decision attitudes are particularly important when considering decision behavior and particularly reaction to difficult trade-off decisions. Decision behavior is generally considered against the extent to which people are decision seeking or decision averse. Most people are decision seeking when making decisions for themselves, and decision averse when they are making decisions for others and this appears to be related to a desire for the self-determination of the affected parties (Beattie et al 1994). In EIA, the approval decision in most cases rests with one party (e.g. environment Minister) who must make decisions on behalf of all the other stakeholders, i.e. implying decision aversion will be the norm. However the process of arriving at the EIA approval decision point should of course include stakeholder engagement; and the way in which that process is conducted should influence the degree of difficulty experienced by the decision-maker (e.g. if consensus has already been reached with stakeholders then the decision presumably would be relatively easy). Furthermore, research suggests that decision aversion is most apparent when the decision potentially violates principles of equality or equal treatment and/or when it could potentially cause a negative outcome for others. These properties seem to be morally based, dealing with equity and self-determination.

Research exploring the effect of emotion on decision-making shows that greater emotional difficulty leads to decision avoidance (Luce et al, 1999; Zeelenberg et al 1996). Anderson (2003) identifies four decision avoidance effects on decision-makers: choice deferral, status quo bias, omission bias, and inaction inertia, and notes that the emotional nature of difficult decisions "predispose humans to do nothing" (p139). Hence decision avoidance "manifests itself as a tendency to avoid making a choice by postponing it or by seeking an easy way out that involves no action or no change" (Anderson 2003, p139). This implies that irrespective of whether a decision-maker is decision seeking or decision averse, difficult decisions will result in all decision-makers exhibiting avoidance traits. While decisions occur throughout the EIA process (e.g. Weston 2000, Morrison-Saunders and Pope 2013) it is the approval decision that is typically the most controversial and difficult because of the nature of trade-offs involved. These decisions are often the responsibility of elected officials and unless (or even when) EIA

legislation specifies timeframes for approval decision-making it is not uncommon for long delays to occur at this point in the process.

As discussed previously, morally challenging decisions that involve values trade-offs are the most difficult for decision-makers and have the greatest impact on their behavior. Baron (1997, p72) notes that "many respondents want to 'protect' certain values from trade-offs, regarding them as absolutes" but suggests that in such situations decision-makers are unwilling to distinguish consequences from actions (or ends from means). In other words difficult decisions have the effect of leading decision-makers to resort to a fixed or absolute position without unpacking or understanding the nuances or how they arrived at that position. Baron and Spranca (1997) note that it is probably easier to make decisions if there are protected values to constrain decision-making, and that these are acquired from culture as kinds of 'moral rules' that should never be violated. Similarly Beattie et al (1994, p142) state that: "Societies will try to avoid certain (difficult) decisions by setting up fixed rules that require little interpretation". It is tempting to view the Gibson decision-making trade-off rules (Gibson et al 2005, Gibson 2006) as an attempt to set in place a standardized approach to making difficult trade-off decisions; however we suggest that they are so open to interpretation that they will not satisfy notions of fixed or moral rules.

This is where formal decision aiding techniques frequently employed in EIA, such as multi-criteria analysis (MCA), may play an important role. In MCA, the performances of the alternatives are first compared criterion by criterion (in EIA criteria typically reflect impacts on different environmental components), and then aggregated. The first comparison is performed by transforming the original criterion scores (e.g., noise level measured in dB) into a dimensionless range (typically between 0 and 1) that represents the desirability of that score, i.e., the degree to which it meets the evaluation objectives. This process – usually referred to as normalization – helps to make decision values explicit and allows comparison of alternatives on the basis of those values (Geneletti, 2005). For example, alternative A may produce less noise than alternative B, but if the noise levels are very low in both cases (e.g., below the background noise level) decision-makers may want to assign to both alternatives the same level of desirability.

In the subsequent stages of MCA, stakeholders and decision makers assign weights to the criteria. A weight indicates the importance of one criterion relatively to the other criteria under

consideration. However, when the weighted summation is used as an aggregation method (and this is often the case in EIA applications), weights express levels of trade-offs between criteria, rather than absolute importance levels. As such, they are to be interpreted relatively to the actual range of the scores of the alternatives under evaluation: if this range changes, the weights are bound to change too. This is often not realized by decision-makers who tend to assign importance weights *a priori*, often to protect certain values. MCA techniques, and their implementing tools, help to clarify the actual meaning of the weights and to support the selection of weights specifically suited to the decision-making problem under evaluation. Thus the use of structured approaches such as MCA to guide comparison of alternatives may help to 'unblock' some of the decision avoidance tendencies noted by psychologists.

Difficult trade-off decisions also cause emotional conflict which often leads to simplified decision strategies in which the decision is based on the single most important attribute rather than on a consideration of trade-offs among all relevant attributes. Moreover, emotional conflicts lead people to favoring the status quo and avoid change (e.g. Anderson 2003). Finally, emotional difficulty may lead to extra weight being given to minimizing losses as opposed to enhancing equivalent gains (e.g. Beike and Sherman 1998; Anderson 2003). Therefore in a time where there is increasing emphasis placed in EIA on the need to enhance gains rather than minimize impacts (e.g. Gibson 2006) decision makers would, when faced with difficult trade-off decisions, continue to be more concerned about trade-off losses than about trade-off gains.

The potential for post-decision regret, worry or uncertainty, whether anticipated or experienced, also influences the choices people make and causes people to avoid decisions (e.g. Beattie et al 1994, Zeelenberg 1999, Krosch et al 2012) and can lead to excessive information gathering which simultaneously delays the making of a decisions whilst having the potential to reduce potential regret or uncertainty. This finding from the psychological literature can explain EIA situations in which regulators are relatively inexperienced and take a cautious rather than decisive approach by, for example, asking proponents to provide additional information or allowing scoping to become all-inclusive (e.g. Ross et al 2006; Kidd and Retief, 2009). The research of Zeelenberg et al (1996, p157) found that in addition to changing pre-decision behaviour: "regret aversion results in choices that shield people from threatening feedback on forgone alternatives". The field of EIA follow-up is predicated on "learning from experience" (Marshall et al 2005, p177); it is interesting to reflect that difficult trade-off decisions in EIA (i.e.

the kinds of situations where learning might be particularly useful for future practice), are potentially also those that might be psychologically suppressed.

Zeelenberg et al (2000) distinguish between the psychological phenomena of regret and disappointment experienced by decision-makers. While similar decision avoidance results in both cases, the authors note that avoiding risk is a simple way of avoiding disappointment and that one way of doing so is to opt for safe alternatives where the outcomes are known in advance with considerable certainty. This may explain why decision-makers tend to prefer the status quo and hence why EIA so often lends itself to 'business-as-usual' rather than the consideration of relatively radical alternatives. One positive effect of perceived disappointment reported by Zeelenberg et al (2000, p535) is that decision-makers may try harder to attain a desired outcome and invest more effort in the task on the basis that "Another way of avoiding disappointment is by trying to live up to one's initial expectations".

A related field of research specifically examines the influence of regret on decision-making and argues that trade-off decisions are difficult because decision-makers fear regret (Luce et al 2011, Zeelenberg et al 1996, Zeelenberg et al 2011). The possibility that another choice option may lead to a better outcome causes true decision conflict. This fear of regret relates to either the regret of making a particular trade-off decision (and taking a risk) or regret of not making a decision (i.e. taking a risk), which results in delayed decision-making and a typical need for more data or information. The eventual outcome of decisions also affects future similar decisions because the fear of regret leads people to being more cautious or more risky depending on their regret experience (Zeelenberg et al 2011).

In this section we have established that trade-off decision behavior within EIA can be explained and to some extent predicted based on psychology research. The next section explores ways of dealing with difficult trade-off decisions.

4. How can we deal with difficult trade-off decisions?

In previous sections we described factors that influence decision difficulty, also referred to as the predictors of decision difficulty. By pro-actively considering these difficulty factors/predictors, ways can be found to address or avoid difficulty. For example, the first predictor suggests that

in a decision-making context where there is a prevailing high level of uncertainty decision-making becomes more difficult. Therefore difficulty in decision-making could be addressed by avoiding high levels of uncertainty. Within an EIA context this is particularly challenging because EIA almost always functions within high levels of uncertainty. Dealing with uncertainty has been a hot topic of debate in EIA through discussions on the application of the precautionary principle and the role of science (e.g. Cashmore, 2004), but it is not the purpose of this paper to repeat what has already been covered in the EIA literature. However, learning from the psychology literature suggests that the level of uncertainty also relates to the way a decision is framed which can have significant effects on responses (e.g Markman et al, 1993; Houston et al 1999, Kahneman and Tversky 1984, Beike and Sherman 1998, von Winterfeldt 2001). In the terminology of psychology, 'framing' refers to the way in which decisions or choices are presented to decision-makers (Tversky and Kahneman 1981); for example "as a problem or an opportunity, as a strategic choice or a tactical move, as an approach to balance multiple objectives, or as a means to meet a specific goal" (von Winterfeldt 2001, p261). Tversky and Kahneman (1981) found that a decision frame is well presented if the stakeholders agree that the decision alternatives are defined at the right level of abstraction (e.g. strategic vs tactical), that the alternatives include the ones they prefer, and that the objectives cover all of their concerns.

Gregory et al (2012, p212), who similarly draw upon the psychological literature, suggest that good practice with respect to making trade-off decisions should include the use of multiple framings and multiple elicitation methods to "draw on both cognitive and intuitive systems of thinking and to draw on both individual and group thinking". Their approach is very similar to SEA and sustainability assessment approaches as promoted in the impact assessment literature (e.g. Therivel 2004); i.e. involving setting objectives, engaging stakeholders throughout and selection and enhancement of the chosen alternative following in-depth MCA or similar processes.

Another framing consideration is the way criteria or indicators are used to compare the alternatives, and in particular how they are presented and arranged in a hierarchy. This concerns not only criteria ordering, but also the complexity of the hierarchy (how many levels), as well as the level of 'balance' among the different levels, since people are biased to overweight parts of a criteria hierarchy that are developed in detail relative to those that are not (Weber et al 1988). Furthermore, decision-making normally takes place under human

information-processing constraints. These constraints should be accounted for in the decision framing. Psychologists have proved that human intellectual ability is limited in certain respects, and in particular have difficulty in dealing with more than seven, plus or minus two, factors at a time. This 'magical number' was proposed by Miller in his seminal work (1956), and confirmed by several psychological experiments. So, if somebody has to compare the relative importance of 15 impact types at the same time they will give inconsistent answers because the range exceeds their cognitive capacity.

The second difficulty predictor relates to the concern over the outcome and on the basis that the less a decision-maker cares about the outcome the easier the trade-off decision. Therefore one way of dealing with difficulty is to place as much distance between the decision maker and the implications of the decision as possible. An example in some EIA systems is the requirement for EIA consultants to declare their independence and lack of vested interest in the proposed developments. Also from a regulator perspective this is achieved by setting up committees to make recommendations to the final decision maker. In terms of institutional arrangements experience in some jurisdictions shows that local authorities do not make good regulators because the implications of the development in terms of short term local economic gain potentially cloud their judgment. Assigning mandates to higher spheres of government such as provincial, regional or national seems to remedy this situation to some extent.

The similarity between alternatives is the third difficulty predictor and suggests that the more similar the options or alternatives, the easier the trade-off decision. Again, within the EIA context this is problematic since a wide range of alternatives should ideally be considered. However, learning from psychology shows that it also matters if a decision maker is required to choose an alternative or to reject an alternative, because people tend to focus on positive features when asked to choose and negative features when asked to reject. When comparing two alternatives, a focus on the good features of an alternative and choosing it for its merits is relatively easy and psychologically pleasant for decision-makers; Houston and Doan (1996) refer to such decisions as 'approach-approach choices'. In contrast they also describe 'avoidance-avoidance choices' which are characterized by eliminating one alternative on the basis of its detriments and choosing the remaining alternative by default as being relatively difficult and psychologically unpleasant.

A further consideration is the order in which alternatives are compared, which is discussed by Beike and Sherman (1998) at some length. Put in simple terms, comparing A to B is not the same as comparing B to A. The first alternative considered becomes the subject and the latter the referent. In decision-making a person considers what they know about the subject and matches this information to what they know about the referent; thus shared and unique features become distinguished. The key point is that switching the order changes the relationship between two alternatives. In light of a fundamental principle of EIA being the comparison of alternatives, it would be valuable for practitioners to know and understand more about how the simple ordering and presentation of alternatives affects decision-makers, particularly in the context of an internal decision-maker approving a preferred development alternative.

A particular point emphasized throughout Beike and Sherman (1998) is that it is important within the EIA context that the decision-maker (either an individual or committee charged with making a decision or recommendation about the proposal) understands how the decision has been framed by the proponent or EIA professional and is aware of how this might subconsciously influence the decision-making process. This point has not been made within the impact assessment literature previously (to our knowledge); for example, when Gibson (2006, p175) advocated that when making trade-off decisions that "the most desirable (or least bad) option be chosen" he does not appear to consider the influence of framing on the decision-maker. In contrast, Houston and Doan (1996) report that framing as the 'least bad' alternative creates greater levels of choice conflict, resulting in longer decision times, as well as lower post-choice feelings of satisfaction with the choice made, and lower post-choice evaluations of both the chosen and rejected alternatives. In short, choosing something (i.e. a focus on the positive) is different from rejecting something.

The fourth difficulty predictor relates to dealing with morality and values on the basis that if there is a strong moral conviction related to a particular alternative then trade-off decision-making becomes easier. With respect to how policy-makers should approach trade-off decisions involving conflicting values and morals (as a predictor of decision difficulty), Beike and Sherman (1998) note that the two dominant recommended approaches in the literature are 'mechanisms of electoral accountability' (i.e. transparency and public accountability) or via 'technocratic mechanisms' such as cost-benefit analysis or MCA. However, they go on to state that "Both fail, however, to come to grips with the qualitative complexity of social life and the irreducible pluralism of our moral intuitions" (p257). This is because merely making explicit the possibility of

these types of trade-offs "weakens, corrupts, and degrades one's moral standing" (p256) and that "From the standpoint of political expediency or even social peace, honest, integratively complex reasoning that renders the trade-offs transparent is likely to be the least effective strategy" (p257). We quote the findings of Beike and Sherman (1998) at some length here because they are fundamentally counter to the prevalent advice proffered in the EIA literature. The Gibson (2006) decision-making trade-off rules, for example, are founded on transparency and disclosure of trade-offs in EIA decision-making, but as the psychology literature makes abundantly clear, taboo trade-offs are akin to political suicide.

Finally, the fifth difficulty predictor argues that decisions concerning trade-offs between non-commodities are more difficult and take longer than those considering commodities and currencies. The learning from psychology serves rather as a caution about the pitfalls and difficulties in dealing with non-commodity trade-offs than providing explicit solutions on how to deal with this challenge. As stated by Beattie and Barlas (2011, p62):

Given the limited information processing capacity of humans and the many judgmental errors that we habitually make, decision aids should be extremely useful in a wide variety of problem applications. We wish merely to question whether the same technologies used for commodities and currencies should be extended to non-commodities, or whether we should look at new technologies to aid people in making what are potentially difficult and painful decisions.

Therefore the psychology literature suggests that there are no 'off the shelf' solutions or technologies to deal with the complexities of non-commodities, but that recognition of the role of different value systems in decision-making (as described previously) seems central towards finding solutions.

7. Reflections and conclusions – Key learning points for EIA

Our aim in this paper was to distill key learning points from the preceding discussion for dealing with trade-offs in EIA. Although we do not claim to have provided definitive answers to all the questions raised, we have shown that the field of psychology offers rich insights and key learnings for dealing with trade-offs in EIA. Figure 2 expands on Figure 1 and provides a conceptual summary of the key learning points highlighted in this paper.

The first key learning point is that the three questions posed in the introduction (Figure 1) are interrelated and insights related to the one invariably inform the other. For example in dealing with the question, how can we deal with difficult trade-off decisions? - it helps to understand when decisions will be difficult and what behavior is expected. Solutions could typically relate to addressing factors that enhance difficulty or predicting and anticipating certain behavior. Similarly, how EIA decision-makers react to difficult trade-off decisions could be pro-actively informed by predicting decision difficulty in the first place.

The second key learning point is related to difficulty prediction. It is clear from the so-called predictors of decision difficulty such as level of certainty, concern over the outcome, similarity between alternatives, morality and values as well as dealing with non-commodities, that they are all to some extent recognizable in day to day EIA practice. This suggests that by its very nature EIA practitioners should expect a high level of decision difficulty when dealing with trade-offs. Moreover, with increasing focus in impact assessment turning towards consideration of sustainability, the level of trade-off decision difficulty could be expected to increase even further. Through considering the psychology literature covered in this paper we have confirmed that EIA functions within an extremely difficult trade-off decision-making context.

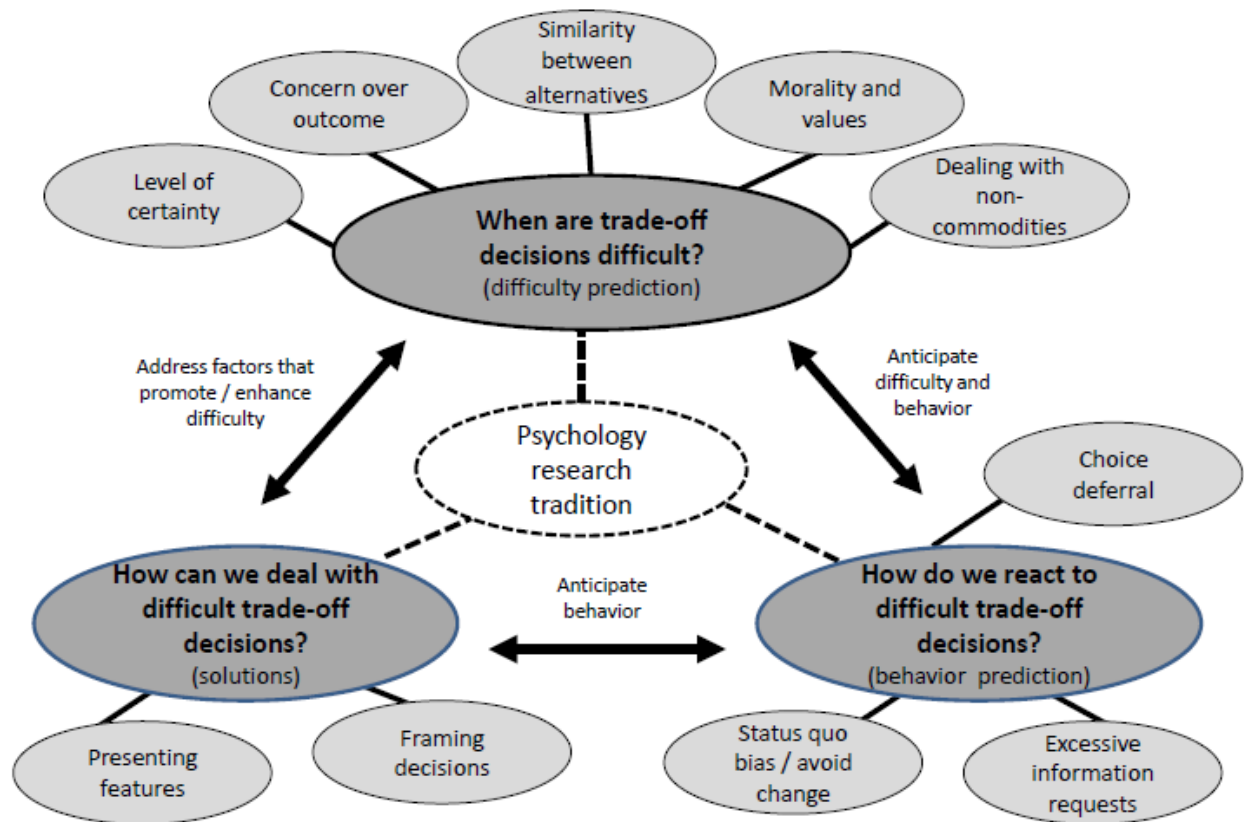


Figure 2: Key learning points for dealing with trade-offs in EIA

Similar to the decision difficulty predictors, the behavioral reactions to difficult trade-off decisions observed by psychologists mirror what is experienced in EIA practice. Reactions such as choice deferral, status quo bias and at times excessive information requests, are typical within EIA systems internationally. The third key learning point is that these reactions have been shown to be typical or expected (or even normal) within psychology. The EIA community has spend a lot of time trying to iron out or deal with these reactions through policy measures and legislative reforms such as placing timeframes on decision-making or prescribing information requirements for EIA. If, however, EIA practitioners were to acknowledge that these symptoms have a psychological origin they might start to think differently about how to deal with them.

This leads us to our fourth and final key learning point which is that finding solutions for dealing more effectively with difficult trade-off decisions will rely on the ability to predict decision difficulty and anticipate behavior, as well as how we present features and frame decisions. Fundamentally, we also argue throughout that understanding and finding solutions to dealing with difficult trade-off decisions requires recognition and understanding of the role of values and

morality. It is therefore appropriate to quote Caldwell (1989, p12) who stated that “EIA will be most effective where environmental values (1) are implicitly and consensual in the national culture and (2) are explicit in public law and policy”. This paper supports the view of Caldwell (1989) and acknowledges that many of our difficulties in dealing with trade-offs are linked to the lack of consensual values when dealing with trade-offs.

It is our hope that after reading this paper, EIA consultants, government regulators and other interested parties will better understand why they may be struggling to deal with a particular trade-off decision and/or why they observe certain decision-making behavior in others. Also, we hope to have provided some useful insights as to how to deal with difficult trade-offs in practice. The further challenge now is for the EIA fraternity to adapt and apply the lessons learnt from psychology research to everyday EIA practice. This paper is a first step towards this goal.

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