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REFLECTIONS ON DECISION-MAKING IN CONSERVATION

Keywords: Bayesian, collections care, data, decisions, expected utility, heuristics, psychology, satisficing

ABSTRACT

Conservation involves decision-making: whether planning the treatment of a single item or the collection care strategy for thousands of objects. Conservators making decisions about the collections in their care are often frustrated by the limitations of the data available to inform them. Within conservation literature, the usual starting point is that correct decision-making is 'rational', meaning decisions are based on weighted evaluations of all of the benefits and costs of a range of options. This paper describes an alternative approach based on an interdisciplinary study of psychology literature. Heuristics such as 'take the best', 'elimination by aspects' and 'satisficing' are discussed with their application to conservation situations. When faced with a complex problem and a lack of data, conservators may be able to improve the quality and efficacy of their decision-making for collections care by placing a greater emphasis on criteria selection and prioritisation over data collection.

RÉSUMÉ

La conservation-restauration implique la prise de décisions, qu'il s'agisse de planifier le traitement d'un objet unique ou la stratégie de soin pour une collection comportant des milliers d'objets. Les restaurateurs qui prennent des décisions à propos des collections dont ils sont responsables sont souvent frustrés par les limites des données à leur disposition. Dans la littérature de la conservation-restauration, le point de départ habituel veut qu'une bonne prise de décision soit « rationnelle », c'est-à-dire que les décisions se fondent sur des évaluations pondérées de l'ensemble des avantages et des coûts d'une série d'options. Cet article décrit une appro-

INTRODUCTION

Classic (rational) decision-making is often proposed as an appropriate model for conservation decisions (Caple 2000). This attitude is in line with many business approaches of considering weighted benefits and the probabilities of various outcomes to make decisions (Newell et al. 2007). In reality, conservators have to make many decisions without complete data. Whilst seeking more data is always a valid recommendation, it is not always a valid solution. Unless there is a full set of data to accurately establish probability of each option, weighted probabilities become as subjective as any other decision-making approach. In these instances conservators have a choice; they can either bemoan their lack of data or develop their decision-making abilities in situations without adequate data.

This paper reviews decision theories with an emphasis on those that have evolved from studies of how people actually make decisions, rather than by considering how they should. It compares classical rational decision-making models with decision heuristics. It argues that trained and experienced conservators have an expertise that they can offer their institution that is far more useful than simple data processing capacity. The unique quality that expertise offers is the identification of criteria for decision-making (Newell et al. 2007). Clarity in defining and prioritising criteria may make evaluations simple enough to avoid the need for extensive data collection.

Within collections care literature there has been an argument for a paradigm shift away from assessment of damage to an understanding of risk (Waller and Michalski 2005). This process calls into question how conservators handle risk, a subject discussed elsewhere (Ashley-Smith 1999) and briefly below. It has also generated a methodology that is fast becoming associated with the risk assessment, the Cultural Property Risk Analysis Model (Protect Heritage 2010). This model fits a general drift within society to a target driven culture that can, in some circumstances, lead to data collection and box ticking counting for more than professional opinion or valuable outcomes (Guardian 2010). The collection of inaccurate or subjective data masked by over-confident interpretation can offer false insight into collection condition. This paper sets out to rebalance collections care literature away from collecting figures back to developing thought processes. An appreciation of the instinctive ways that people make decisions

che alternative basée sur une étude interdisciplinaire de la littérature en psychologie. Des concepts heuristiques comme « la recherche du meilleur », « l'élimination par aspects » et le « seuil de satisfaction » sont discutés ainsi que leur application à des situations de conservation-restauration. Face à un problème complexe et devant le manque de données, les restaurateurs pourraient améliorer la qualité et l'efficacité de leurs décisions relatives aux soins des collections en accordant une plus grande importance aux critères de sélection et à la hiérarchisation qu'à la collecte de données.

RESUMEN

La conservación implica la toma de decisiones: ya sea para planificar el tratamiento de un objeto único, o bien la estrategia para cuidar una colección de miles de objetos. Los conservadores responsables de tomar decisiones sobre el cuidado de las colecciones a menudo se sienten frustrados por las limitaciones de la información disponible para poder decidir. Dentro de la literatura sobre conservación, el punto de partida suele ser que la decisión correcta sea "racional", lo que quiere decir que las decisiones se basan en evaluaciones sopesadas de todos los beneficios y costes de una serie de opciones. Este artículo describe un acercamiento alternativo basado en un estudio interdisciplinario de publicaciones de psicología. Afirmaciones heurísticas como "escoger la mejor", "eliminación por aspectos" y "que satisfaga" son discutidas con su aplicación a situaciones en el campo de la conservación. Cuando se enfrenten a un problema complejo y a una falta de información, los conservadores pueden mejorar la calidad y la eficacia en su toma de decisiones para el cuidado de las colecciones poniendo un mayor énfasis en los criterios de selección y la priorización que en la recolección de datos.

(heuristics) allows the process to be examined and acknowledged, allowing for fast and efficient decisions where appropriate.

CLASSIC DECISION-MAKING THEORIES

One of the first problems with the rational decision-making model is that it may describe what (some argue) we 'ought to do' rather than what we actually do. Rational or 'normative' decision-making relies on mathematical calculations of the maximum expected utility (MEU) of each possible outcome. For each scenario, a range of outcomes are generated and the value that the option delivers is calculated. Although values do not have to be monetary, the process focuses on calculating and comparing numerical values; thus, numerical data must be generated. In conservation, this may mean describing the use value of a piece of silk after x thousand lux-hours of exposure. This process, also described as Bayesian decision-making, is data greedy. Bespoke computer software packages can simplify the calculations, but it is the conservator that has to input the values for each options. The conservator must also measure or predict the value of each outcome considering each variable and an assessment of its impact, and likelihood. Other descriptions of conservation decision-making follow the format of expected utility by identifying and ranking multiple outcomes, even if numerical values are not generated (Keene 1996).

HEURISTIC DECISION-MAKING

Heuristic decision processes (or shortcuts), are those that people utilise when under time pressure, or with limited data. Heuristic decision-making focuses on making very simple mental calculations based on the comparison of very few options against a limited set of criteria (or cues). Heuristics can result in the selection of the best option based on a positive or negative evaluation of a single criterion. Some psychologists argue that this process can be prone to bias (Kahneman et al. 1982), while others argue that heuristics can lead to outcomes that are as good as or better than Bayesian calculations (Gigerenzer et al. 1999). An understanding of the process of heuristic decision-making can offer insight into how to reduce bias and improve outcomes.

Heuristic decision-making happens; it is a necessary survival mechanism in a lifetime full of choices. The value to conservators in understanding the topic lies in their ability to recognise where heuristics are in operation. and by this maximising the efficiency of the decision-making process whilst actively working to reduce any bias that heuristics may introduce.

Heuristic decision models involve defining and ranking decision criteria and then using minimal effort to test the alternatives against them. The 'recognition' heuristic has been examined by asking non-experts to pick a portfolio of shares in the stock exchange simply by selecting companies that they recognise. Research shows that this can be as effective as a professionally managed portfolio at returning profit (Gigerenzer et al. 1999). This heuristic operates with only one cue – recognition. Other approaches,

such as 'take the best' (Newell et al. 2007), involve prioritising the decision cues and then evaluating options against them one at a time, stopping as soon as the cues discriminate between outcomes. A similar but near opposite strategy of 'elimination by aspects' (Newell et al. 2007) involves the use of prioritised cues to reject options using cues until all but one option is eliminated. The advantage of these methods is that once cues are ordered, most of the options will never have to be measured against them, massively reducing the data processing requirements of the operation. Consider a conservator who becomes aware of some money at the end of a financial year and wants to buy monitoring equipment. As there is a very limited time to spend the money, the conservator may select suppliers by the recognition heuristic, then establish if it would be possible to invoice for the equipment within a week (elimination by aspects). It would only be if these two heuristic techniques left more than one option that any further data on the detailed specifications need to be considered. This form of decision-making may appear instinctive, and the proponents of heuristics argue precisely that it is; however, recognising and labelling the process can save time and allow conservators to commit what little time they have to the analysis of the limited options remaining.

Another heuristic is 'satisficing' (Gigerenzer et al. 1999): the process of looking for satisfactory outcomes rather than perfect ones. Satisficers define an acceptable outcome, then simply stop evaluating options when they identify one that matches this good enough level. This approach is especially vital in a situation where the available options change, perhaps reducing, over time. Think of buying a home or selecting a life partner, if you take too long looking you may end up with none. For conservators the scenario may be approving a 'good enough' fabric for the inclusion in a case design, rather than running repeat tests that frustrate the design team's deadlines to the point that they bypass conservation input entirely. Any situation that involves the competition for resources involves the danger that they disappear before a decision is made. A speedy satisficing approach may lead to a quicker and more effective outcome than a more perfect but entirely un-fulfilled decision. The efficiency of satisficing is that decision makers never have to identify all of the options, thus massively reducing the burden of data evaluation.

CONSERVATION DECISION-MAKING

Unlike classic decisions about share prices, gambling or social behaviour, most conservation decisions are made about situations that are unique and which have very little certain or verifiable data. The common and logical approach to this problem is to conduct further research to supply the missing data, for example the research on corrosion of iron necessary to plan the display of the SS Great Britain (Watkinson and Lewis 2004). However, research requires funding, time and expertise. In some situations, this option is simply not available. Furthermore, trying to create Bayesian calculations for all of the variables in the preservation of a mixed collection in a multi-site museum opens up a range of outcomes that require unattainable levels

of data processing capacity. Whilst the pursuit of scientific research is an essential element of the development of the conservation profession, it is not always an available solution.

Consider then using classical decision-making techniques for a typical preventive conservation question: should the relative humidity target for a museum with a mixed collection be 55±5% or should it be broader, for example, 55±10%? For each option, general data could be collected about the environmental response of material types to humidity fluctuations and this applied to individual items or categories of object defined by vulnerability; then, a degree of or a change in risk probability could be calculated for each option. The ten agents of deterioration could be used to categorise the risks of damage by identifying a percentage loss of value from each of the risk possibilities (Waller 1994). This process is complex and many conservators would struggle to assign numbers at each stage, even if working with curatorial and technical colleagues and experts. Whenever an option is defined without fully empirical evidence, a best approximation must be made or a subjective decision used. This subjectivity seems inevitable when defining loss of value as the nature and use of collections changes over time. Inevitably then the process is wholly or partially subjective. Any missing data or estimates make this method less accurate, and given the time it may take to conduct this process, it may furthermore prove inefficient. It could be argued that if the results unlock significant resources for improvements in collections care, then the research was highly efficient, but the efficiency of the methodology can only be validated if the outcome could not have been achieved by simpler means. The result is a complex, resource heavy, process that may offer neither objectivity nor accuracy. This critique is also offered of classical decision-making in general (Gigerenzer et al. 1999). A further critique that may be offered is that regardless of intention, the process of data gathering can lead to a rather narrow focus on deterioration with an element of use to the exclusion of other wider cultural considerations (Slogget 2009).

THE DECISION-MAKING PROCESS

An alternative approach to calculating myriad predicted outcomes is to identify and value decision heuristics as an appropriate and inevitable way of making conservation decisions. Based on this acceptance, the decision maker would identify where heuristics were appropriate and move their focus and effort to the careful selection and evaluation of the decision-making criteria, rather than on data collection and comparison. The focus on decision criteria opens up the scope of decision-making and consequently can also create more opportunities to involve others (Slogget 2009).

Decision-making involves several phases including: identifying a problem; selecting the criteria for assessing the outcome; hypothesis formulation and testing; gathering data; comparing and assessing data; making the

decision and implementing it (Henderson 2010). If conservators are aware of when it would be most efficient to move effort from data collection and comparison to examining ways that criteria can be selected, prioritised and evaluated, it will improve their decision-making skills. Where data is collected, resources can be focussed on collecting precisely the data needed rather than data sufficient to model every possible outcome.

Data collection and comparison

For effective decision-making it is essential to retain focus on the point where the cost of collecting and evaluating data outweighs the benefits. This is contrary to the emphasis often expressed in conservation literature and exemplified in Appelbaum's exhaustive work on conservation treatment methodology (2007), which offers hundreds of pages on how to collect data and almost nothing on the actual process of decision-making.[1] If data evaluation is against a simple criterion, i.e. a recognition heuristic, both the data collection and evaluation is simple.

Criteria selection

Resisting the drive towards greater data capture and manipulation that is encouraged by greater sophistication in data processing allows conservators to retain focus on what outcomes are appropriate and what factors are available to measure success. This process need not focus exclusively on the conservator making the decision nor on damage functions as the main criteria. It is fruitful to set decisions within a wider social context and involve other stakeholders in the process. Questions such as why this conservation measure is being considered, who will it benefit and how, will naturally open up a more interdisciplinary line of enquiry. Furthermore, the wider the decision-making criteria are opened up, the clearer the decision may become.

Goal definition and decision-making criteria

An important starting point in selecting decision-making criteria is to identify the desired outcomes, or goals from the process (Kahneman et al. 1982). Conservators should consider whether they aim to make things better than the present state or whether they consider the perfect outcome and work out how close they can get to that final state. Prospect theory describes how these two subtly different approaches (change state or final state) will impact on the evaluation of the success of a project and the approach to risk in decision-making (Kahneman et al. 1982). Classical decision-making process, such as expected utility theory (EUT), advocates starting from the final state, or assets (Newell et al. 2007). Almost inevitably both the predictable and actual outcomes will fall short of this desired final state. Prospect theory suggests that this inevitably means that the outcome is framed by decision makers as a loss encouraging risk aversion. In contrast, where an outcome is conceived as better than the current state, the decision maker will perceive outcomes as a gain which increases

tolerance of risk. Neither approach could be called 'correct' but the impact should be recognised. Given that the ultimate outcome for collections is decay (albeit at a rate moderated by astute conservators) prospect theory offers the conservator the caution that setting goals informed by the best outcome leads to a risk aversion with all but the smallest risks.

CRITERIA SELECTION OVER DATA COLLECTION

Michalski's stimulating paper on Social Discount Rate (2008) demonstrates the EUT approach to deciding outcomes. This process utilised the software system Analytica™ to model the relationship between mixed collections, their decay and value over time in order to decide on priorities for collections care. This data hungry process provided convincing evidence that it is beneficial to consider both the important as well as the urgent (Covey 2004). If more focus had been given to considering the criteria by which decisions should be made, could a similar answer have been generated more simply? Defining who we are preserving collections for and concluding that this is the most important criteria would allow the conservator to follow the 'take the best' (TTB) heuristic, meaning that decisions on priorities could be decided against a single criterion which best discriminates between outcomes (Gigerenzer et al. 1999). Conservators may be nervous of this approach, considering it over-simplistic. This approach provides no reason to decry those researchers that have the opportunity to investigate problems in detail; it simply offers an alternative to those for whom this is not viable.

HEURISTICS OR RATIONAL DECISION-MAKING?

The choice between heuristics and techniques such as EUT should become explicit and considered. In practice, different factors will impact on the type of decision-making process that a person will adopt. For example, if a person is aware that they are likely to be held accountable for a decision, or feel that it is important they are likely to consider more criteria and evaluate more options when making decisions. Given the context in which conservators work, it seems inevitable that they will state a preference for non-heuristic approaches. However, this only maintains logical consistency if the rational approach actually offers a more accurate decision. Adopting the cloak of rational decision-making by engaging in complex weighting processes but undermining it with estimation and subjectivity must be the worst of both worlds, with neither the confidence provided by EUT nor the efficiency of heuristics. Researchers have shown that in many situations the outcome of decisions made using heuristics are as accurate or useful as those made by more complex routes (Gigerenzer et al. 1999).

To return to the example of the conservator making decisions about collections care in a large mixed collection: they could with total validity use the Waller and Michalski (2005) method, which would focus them on a path of data collection perhaps committing several conservator years. Alternatively, they could look at the 'who what why' questions and engage

in a consultation process with stakeholders. They would spend a larger part of their time considering what the vital decision-making criteria were and if these would positively select outcomes (TTB) or help reject outcomes (eliminate by aspects). With a much narrowed field of options they may return to a more detailed analysis to discriminate between the criteria that are important to all those affected by the decision.

CONCLUSION

Weighting and evaluating cues works well with lots of time, data and resources, but these halcyon conditions are rare. In many daily life situations the heuristics have much to offer. An unquestioning acceptance of rational decision-making as the only approach limits the options for conservators and may not lead to the most efficient, accurate nor effective decision-making processes.

ACKNOWLEDGEMENTS

Thanks to Diane Gwilt, Phil Parkes and Dave Watkinson for their advice on the paper.

NOTES

[1] Neither data nor decision-making appear within the index, but under the title 'information relevant to the treatment decision-making process' the author notes that 'all the information collected and developed during the characterisation phase contributes to conclusions about the object's current physical state and its physical and cultural history', but adds it is 'not appropriate at this point to decide on a treatment level'. No other section clearly indicates how to move from data collection to decision.

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