

**UK Review of the provision of
information about higher education:**

Advisory Study and Literature Review

Report to the UK higher education funding
bodies by CFE Research

April 2014

**Dr Abigail Diamond
Professor Jennifer Roberts
Dr Tim Vorley
Dr Guy Birkin
Dr James Evans
Jonathan Sheen
Tej Nathwani**

For more information about this report please contact:

Abigail Diamond

CFE Research

Phoenix Yard

Upper Brown Street

Leicester

LE1 5TE

T: 0116 229 3300

W: www.cfe.org.uk

E: abigail.diamond@cfe.org.uk

Established in 1997, CFE is an independent not-for-profit company specialising in the provision of research and evaluation services across the fields of education, employment and skills.

CONTENTS

Executive Summary	4
Research Background, Aims and Approach	4
Key Findings	4
Principles for Information Provision in Higher Education.....	7
Potential Areas for Future Research	9
Chapter 1: Introduction.....	11
1.0 Project Background.....	11
1.1 Aims and Objectives.....	12
1.2 Methodology	12
1.2.1 Literature Search	12
1.2.2 Literature Selection and Categorisation	12
1.2.3 Literature Analysis.....	13
1.2.4 Literature Synthesis	14
1.3 Report Structure	14
Chapter 2: Understanding Information	15
2.0 Chapter 2 Summary	15
2.1 An Introduction to Information.....	15
2.1.1 Conceptualising and Measuring Information.....	16
2.1.2 The Limitations of Information Theory.....	17
2.2 Information and the Social Sciences.....	17
2.2.1 Information Science.....	17
2.2.2 Information Behaviour	18
2.3 Conclusion.....	19
Chapter 3: Understanding Information Behaviour	21
3.0 Chapter 3 Summary	21
3.1 Fundamental Concepts in Behavioural Economics	21
3.1.1 Bounded Rationality	22
3.1.2 Heuristics and Biases	23
3.1.3 Information Overload and the Paradox of Choice	25
3.2 Other Principles in Behavioural Economics	27
3.2.1 The MINDSPACE Framework	27



3.3	Applications of Behavioural Economics	29
3.3.1	Developing Reflexive Decision-Making.....	30
3.3.2	Improving Decision-Making in Higher Education.....	32
3.4	Conclusion.....	33
Chapter 4:	Social and Environmental Influences	34
4.0	Chapter 4 Summary	34
4.1	Social Theory of HE Information and Decision-Making	34
4.1.1	Field, Habitus and Cultural Capital	35
4.1.2	Socioeconomic Background.....	36
4.1.3	The Influence of Schools on the Transition to HE.....	37
4.1.4	Key Influencers	38
4.2	Conclusion.....	39
Chapter 5:	Sources and Presentation of Information.....	40
5.0	Chapter 5 Summary	40
5.1	Sources of Information Used	40
5.1.1	How People Deal with Different Sources of Information	41
5.2	The Role of ICT in Information Provision	44
5.2.1	User Interactions with Available Information.....	44
5.2.2	The Use of ICT in Higher Education Choice.....	47
5.3	Conclusion.....	48
Chapter 6:	The Complexity of HE Decision-Making	49
6.0	Chapter 6 Summary	49
6.1	How People Make Decisions	49
6.1.1	The Implications for Higher Education Choice	50
6.2	Conclusion.....	51
Chapter 7:	Conclusions and Recommendations.....	53
7.0	Chapter 7 Summary	53
7.1	Conceptual Framework for Understanding Information Behaviour.....	53
7.2	What Does This Mean For Providers of Information About Higher Education? ..	54
7.2.1	The Limitations of Information-Processing and its Effect upon Decision-Making	55
7.2.2	Social and Psychological Factors Play a Central Role in Information Behaviour and Decision-Making	55



7.2.3	The Role of Higher Education Information Providers Should Be to Support Decision-Making and Empower People to Make Better Choices for Themselves	56
7.2.4	Decision-Making Can Be a Very Personal Activity and Higher Education Information Providers Should Work toward Tailoring Information Provision to Individual Cases	56
7.2.5	Providers of Higher Education Information Should Be Mindful of the Complex and Dynamic Nature of Information Seeking	56
7.3	Principles for Information Provision in Higher Education	57
7.4	Areas for Further Research	60
7.4.1	What Are the Patterns of Information Behaviour in HE?	60
7.4.2	Is Data Visualization Effective for Presenting Information about HE?	61
7.4.3	Does a Reflexive Approach to Decision-Making Work for Higher Education?	62
7.4.4	What Opportunities Do Future Technologies Offer?	63
	Bibliography	64
	Appendix 1: Literature Search Terms	72
	Appendix 2: Literature Analysis	75
	Appendix 3: Data Visualisation as a Solution to Information Overload	77
	Appendix 4: List of Abbreviations	82

EXECUTIVE SUMMARY

Research Background, Aims and Approach

This Advisory Study was commissioned by the UK higher education (HE) funding bodies to inform the provision of information about higher education. Currently the UK HE funding bodies are reviewing the way in which they provide information about HE so that improvements can be made for a wide range of stakeholders and purposes. The aim of the review, which is being overseen by the Higher Education Public Information Steering Group (HEPISG), is to provide a coherent evidence-based framework in the UK for the provision of information about HE.

This report is the final output of a study which was commissioned to inform and underpin the review by examining how prospective students use information to decide whether to study at HE, what to study at HE and where to study at HE. The purpose of the report is to examine how information is used, both by prospective students and in more general terms, and to provide insight into the behavioural aspects of information use. It identifies the fields of study that are able to support this understanding, summarising recent research findings in the fields of information science, cognitive and behavioural psychology, behavioural economics, and social theory.

The study methodology comprised a structured literature review, including focused search procedures of academic databases and 'grey literature'. The initial search identified around 220 sources for review, with further sources gathered as the searches were refined and the reliability of available evidence was evaluated. A process of literature categorisation and the use of an analysis framework enabled a ranking of sources by relevance, quality and methodological strength. This statistical bibliographic analysis allowed for the identification of gaps in knowledge, which then provided guidelines for further searches and/or which highlighted areas for future research.

Key Findings

Evidence presented in our study suggests that information behaviour (that is, activity relating to the acquisition and use of information) is influenced by a range of factors including personal and psychological traits, as well as social and environmental conditions. Each of these aspects not only influences information-seeking behaviour, but also decision-making behaviour. For example, personal characteristics (such as psychological or behavioural traits) can inhibit thorough searches, social pressure (e.g. from peers) may reduce opportunities, and environmental factors (such as proximity to home) also have a bearing on choices and decisions and have the potential to affect how prospective students make choices about higher education.

A person's capacity for rational and non-rational behaviour can be theorised in terms of two hypothetical mental systems: System 1 provides automatic and largely emotive responses, whilst System 2 is more deliberate and cognitive. Both systems are central to decision making and neither should be seen as superior to the other. Behaviour that is perceived as non-rational can sometimes be explained in terms of the influence of System 1 thinking which tends to happen quickly and with little explicit information processing. However, in some circumstances this affective response is the appropriate one to bring



about a decision most satisfactory for that person. Equally, having too much information can sometimes hamper effective judgement and decision-making, causing stress and reducing the ability to function effectively. For providers of information about HE, understanding behavioural principles may offer a route to enabling a more informed and reflexive approach to student decision-making. That is, to aid understanding of how people use information about the conditions of activity they find themselves in, and more specifically how they use this information as a means of reordering or redefining what that activity is.

For example, there is potential to use behavioural insights to support HE decision-making by making people aware of their own tendencies and biases. Knowledge of the psychological and social factors that influence information behaviour may be used not only to understand the behaviour of others, but also to improve a person's ability to deal with information. Existing public policy applications of behavioural economics have looked to 'nudge' people toward more positive (or less negative) behaviour. In the context of HE choice however this is less appropriate because what might be considered a "best outcome" for one person may be not be optimal for another. In this regard, the intention of HE information providers is to better inform decision-makers and to empower people to make choices that satisfy their own personal goals.

Knowledge from the field of sociology can aid understanding of the environment that influences information-seeking and decision-making. Our study draws on evidence that shows how social and institutional factors impact upon both the way people engage in information seeking behaviour, and consequent decisions. A person's socio-economic background, the influence of key people in their lives, and the institutions they engage with (such as their school) are highlighted as particularly important in forming information-seeking behaviour and decision-making. As a result, we suggest that there is a need for providers of information about HE to engage not only with prospective students, but also with those who shape their understandings and expectations, or even those who make the decisions on their behalf.

Varying reactions and attitudes among different groups mean that they require information to be presented in different ways. People use a variety of sources to fulfil their information-seeking requirements, and they employ a variety of methods to reduce the complexity and uncertainty involved in decision-making. This means that there is no single solution for the provision of the "right" information, as the outcomes of student choice are inherently personal. Therefore, information providers need to understand and serve a variety of different needs, aims, preferences, abilities and opportunities that exist within the HE system.

Providing additional sources of information does not necessarily lead to better informed people. The "post-experience" nature of HE means that the effects of attending university may not be known even after the period of study has ended, and that its value can only be estimated. Prospective students are therefore required to deal with varying degrees of uncertainty as neither the costs nor the benefits of various HE options can be known with certainty, and depend on many factors outside the person's control.

Information seeking is dynamic, and the nature and requirement of people's searching is rarely simple. Accessing and using different sources of information does not always result

in either a decision being made or a reduction of uncertainty. In this context it is also possible for people to be overloaded with information, making further progress toward a goal either cognitively or emotionally problematic. Evidence suggests that – regardless of the significant information processing and cognitive stages of decision-making – final selection of a university may often come down to whether or not it feels right.

Technology offers potential ways of dealing with large amounts of information, but it can also introduce complications because of the sheer amount of information that it affords access to. Research into visual perception suggests that the cognitive load of information-processing can be reduced when visual displays are used in place of numerical data. This method of information presentation has the potential to be useful for the type of comparative evaluation tasks that are involved in information behaviour in the context of HE (for example, in comparing the attributes of a number of courses). The design of online information and the ease with which a person uses that information or a website are important precursors to consider in using information to influence decision-making.

Ultimately, decision-making that concerns HE involves less rational consideration than might be first assumed. Factors other than those that can be accounted for in terms of money and time, such as emotional responses, play a significant part in determining the outcome of choices facing prospective students, whether they influence the decision consciously or not. Research suggests that affective factors are not only amongst the strongest influencers of decisions but also contribute to the satisfaction that results from that choice. This research suggests that future efforts to collect and present information about HE should take into account the likely ways in which the information will be used and how this impacts on decision-making. In particular, the following points should be taken into consideration.

- There are limitations to the amount of information-processing that people can undertake when making a decision about whether to enter HE and which course or university to attend.
- In conditions of uncertainty and/or when individuals are unsure of which choice to make, they tend to rely on convenient but flawed heuristics (mental shortcuts) rather than on solely rational criteria. These heuristics reduce the burden created by the complex process of searching for and assessing information about HE options.
- Providers of HE information should be aware of the complex and dynamic nature of information-seeking. In situations where there is potential for an individual to be overwhelmed by the amount of data or information, there is a need for practical and reliable ways of reducing the information-processing task; for example through infographics and data visualisation techniques.
- Decision-making can be a very personal activity and HE information providers should work toward tailoring information provision to individual cases. There is no single solution for the provision of the “right” information.
- Broadly speaking it could be said that there are two types of decision-makers: maximisers who seek more information and evaluate more options and satisficers who make a decision or take action once their criteria are met. Those providing information and advice to prospective HE students need to ascertain which type of individual they are working with and tailor their response accordingly.



- The role of HE information providers should be to support decision-making and encourage individuals to be more reflexive and empowered. This can be achieved by challenging habitual behaviours resulting from cultural norms and any automatic thinking processes to ensure that they make the best choice for them.
- Any research into choices about HE, which involves asking individuals about the information they used and decisions that they made, represents a post-hoc rationalisation. Without sufficient self-reflection, individuals themselves may not be very reliable informants about why they adopted certain information search behaviours or made certain choices.

Principles for Information Provision in Higher Education

We suggest that a successful behavioural approach to the provision of information can enable people to better understand their own needs, and enable them to develop a more informed approach to the complexities of HE decision-making. As a result of reviewing evidence that provides an understanding of how people use information to make decisions, we present a number of principles which can be applied to HE to inform provision of information to support the needs of a diverse group of prospective students (for example, those wanting to study part-time or full-time, mature students or students with specific cultural or socio-economic backgrounds) and across a range of higher education provision. We recommend that these principles should underpin the future of HE information provision.

Principle 1	
Preferences are often partially formed and endogenous to social and economic context, and people are rarely fully informed utility maximisers.	The preferences of prospective HE students are not fully formed as they seek information and make decisions. They are influenced by a wide variety of both personal traits and social and institutional environments. An individual's own curiosity provokes a reflective examination of preferences.
Principle 2	
A large amount of information processing is done unconsciously by our efficient 'System 1' before our inefficient, cognitive 'System 2' is aware.	Much of the current focus of information provision relies on people overcoming their 'System 1' thinking in order to allow for an optimal consideration of participation in HE. However, decisions influenced by 'System 1' can lead to good outcomes for prospective students; since System 1 is responsible for affective or intuitive responses these might be the best way of someone getting a 'feel' for whether something is right for them.
Principle 3	

<p>There is heterogeneity across people’s decision making arising both from individual psychological traits and their socio-economic and cultural backgrounds.</p>	<p>Decision-making is process borne out of context. It is embedded in an individual’s cultural and socioeconomic background, and the situated nature of their understanding of a piece of information.</p>
<p>Principle 4</p>	
<p>It should not be assumed that people can effectively process increasing amounts of information; hence more information on a subject does not always lead that person to be more informed.</p>	<p>The concept of bounded rationality implies that people have a limit to the amount of information they can process. Therefore, effective and informed providers of information are adept at challenging the assumption that ‘more information always leads to more informed people’. The right information for the right person will lead to more satisfactory outcomes for that person.</p>
<p>Principle 5</p>	
<p>Irrespective of the volume of information available, people will make their own judgements as to whether they are informed enough to make satisfactory decisions.</p>	<p>Adaptable information provision focuses on understanding what information is salient to which people. Behavioural science shows that people are not always <i>utility maximisers</i>, and many will not exhaust all information sources before making decisions. Further to this, those people who might be considered <i>satisficers</i> are more likely to be satisfied with their decision than maximisers. Evaluating decisions on the basis of satisfaction and in terms of the individual’s needs and goals can, therefore, be preferable to evaluations on the basis of simply assessing what information is available.</p>
<p>Principle 6</p>	
<p>Information itself can lead people to reassess their current level of understanding about a specific subject.</p>	<p>Information seeking is dynamic, and the nature and requirement of people’s searching, whether it is for decisions about university attendance, which are inherently complex and uncertain, or for more straightforward requirements, can lead to other questions or problems arising. As a result, whether a need is satisfied is not a simple process of understanding.</p>
<p>Principle 7</p>	



<p>There is no ‘one size fits all’ solution to information provision.</p>	<p>The psychological traits of an individual, and the social and institutional context in which they find themselves, all impact on how and why information is used. Whether a piece of information is salient to that person is specific to their personal outcomes, preferred goals and life-experiences. As such, there is no one overarching solution to information provision.</p>
<p>Principle 8</p>	
<p>Too much information can lead to cognitive overload, or an emotional inability to make satisfactory decisions.</p>	<p>Too much information can lead people to disengage effectively with the information-seeking process. It is challenging to identify the point at which the amount of information becomes too much, made more difficult by the fact that people have different capacities for information-processing and because the difficulty of decision-making will also vary.</p> <p>People may not recognise when their own information-seeking has resulted in too much information to process. Furthermore, being presented with too many choices can lead to ‘decision-making paralysis’ which inhibits the ability to reach a satisfactory outcome. These de-motivating conditions occur due to a feeling of helplessness and a lack of control when faced with a task that is too complex and/or too time-consuming to process.</p>

Potential Areas for Future Research

During the course of this study it has become apparent that there are a number of knowledge gaps that could benefit from further research. We summarise these here.

Patterns of information behaviour in HE: Because there is no one-size-fits-all approach to the provision of information, we suggest further research is needed to map information behaviour for specific information needs. Such a study would also be beneficial to help identify at what point information overload occurs and to recognise when a person exceeds their capacity for processing information about HE.

Effectiveness of data visualisation for presenting information about HE: Evidence suggests that visualising data can provide efficient ways of presenting information as it has the potential to reduce a person’s cognitive load. However, there is a lack of evidence about its effectiveness in the context of HE information provision. It would be valuable to test the validity of this approach for information concerning HE choice.

A reflexive approach to decision-making for HE: Evidence suggests that a more behaviourally informed approach to information provision might improve the process of decision-making for prospective students. A comparative evaluation of traditional and behaviourally informed approaches could outline the strengths and weaknesses of each

approach, and would provide an evidence base from which information providers could proceed to develop improvements in their services.

What opportunities future technologies offer: There is potential for HE funding bodies to further explore the opportunities presented by future technologies. Advances in technology-mediated social and institutional interactions can bring greater transparency as well as increased participation in data creation and manipulation. Further research into this area would be valuable to clarify whether any future strategy takes account of users' expectations, with the goal of moving beyond a static dissemination of information, to one which is bespoke, relevant and contextual to that person's needs.



CHAPTER 1: INTRODUCTION

This opening chapter introduces the project background, the main aims and objectives of the Advisory Study.

1.0 Project Background

UK higher education (HE) funding bodies¹ provide information about higher education for prospective students and as indicators of the quality of HE. Between now and the academic year 2014–15, these bodies, working through the Higher Education Public Information Steering Group (HEPISG), are conducting a UK review of the provision of information. To inform their considerations, CFE Research and the Research Exchange for the Social Sciences (RESS) at the University of Sheffield were commissioned to provide an understanding of how information is used and what will be needed in the future.

Unistats is the official website that provides information for prospective students of UK universities and colleges and contains the Key Information Set (KIS). The KIS comprises the information that students have identified as being most useful in making decisions about entering HE and is developed from a combination of sources, including:

- the National Student Survey (NSS), from which measures of student satisfaction are derived
- the Destination of Leavers from Higher Education (DLHE) survey, which gathers information from students six months after qualifying
- universities and colleges, who provide information on courses, accreditation and costs
- UCAS, which provides information on support and fees.

There are currently inherent assumptions about how information about HE is used and how it can be provided, but these are not necessarily founded on sound evidence. While the KIS system was developed on evidence of items of information that prospective students say they find most useful in making decisions about HE, and Unistats was informed by extensive user testing, the fundamental question of how students make decisions has been largely unexamined. Recent research conducted by CFE and RESS on behalf of the Higher Education Academy (HEA) and the National Union of Students (NUS) has presented some challenges to such assumptions, and provides useful analysis of the behavioural factors at play in students' use of information.²

¹ Including: The Higher Education Funding Council for England (HEFCE), the Higher Education Funding Council for Wales (HEFCW), the Department for Employment and Learning – Northern Ireland (DELNI), and the Scottish Funding Council (SFC).

² Diamond et al. (2012). Behavioural Approaches to Understanding Student Choice, HEA/NUS, www.heacademy.ac.uk/assets/documents/research/Student_Choice.pdf.

1.1 Aims and Objectives

A key focus of this Advisory Study was on understanding how people use information to make decisions regarding choice of university. The aim was to better support people to obtain and use information. This is not simply a task of providing information to satisfy existing sets of prospective students' preferences, however. Rather, it required establishing an understanding of the conditions under which prospective students' preferences are formed and the roles of information as a consequence. In this respect it has been equally important to examine the social and institutional context in which information is presented and decisions are made. Existing research has been used in this study in order to achieve the following aims:

- Advise UK HE funding bodies on knowledge about the environment and behaviours that influence the use of information for a range of purposes, both now and in the near future.
- Suggest avenues for further exploration for the review of the provision of information; areas to focus on; and where further work might be useful in order to provide a foundation for the other strands of the review.³

1.2 Methodology

1.2.1 Literature Search

As a starting point for this Advisory Study, CFE Research developed a series of key search terms in order to outline the scope of the literature to include in the review. These terms were grouped under the broad themes of Information, Behaviour and Technology. (A full list of search terms is provided in [Appendix 1](#)). A detailed literature search was carried out by RESS at the University of Sheffield using databases covering academic journals and online sources. Further searches were carried out by the project team at CFE Research and RESS to capture literature that may sit outside of academic sources. This initial literature search identified around 220 documents for further review and analysis. Further sources were identified by following up internal citations and references within the documents retrieved in this initial search.

1.2.2 Literature Selection and Categorisation

During this phase of the Advisory Study each of the documents identified through the literature search was categorised using an analytical framework. This framework involved the development of a classification grid, which outlines each source's key themes, methodology and relevance for inclusion in the research. The literature analysis framework employed a two-level categorization system: four themes provide a broad categorization of

³ These other strands may include: a review of the purpose, suitability, functions, specifications and processes of the National Student Survey (NSS) and a detailed analysis of results and trends; a full review of the Unistats website and the Key Information Set; consideration of how to continue to improve information about salaries and employment outcomes, incorporating the outcomes of the recent graduate review of the DLHE, and current work to secure other data sources; the provision of a framework of current and future information use; a review of the governance of the provision on information to see if it is fit for the newly agreed framework.

literature subjects, each of which is split into a number of topics. Details of the categorisation system are presented in [Appendix 2](#).

1.2.3 Literature Analysis

The selection and categorisation process (described above) allowed for the literature to be analysed by various means. For example, this process allowed the wide-ranging source material to be sorted by specific properties (e.g. year of publication) and the material to be grouped by theme or key words of interest (e.g. presentation of information, or use of websites). The following chart (Figure 1) illustrates the results of this literature analysis (further analytical results are presented in [Appendix 2](#)):

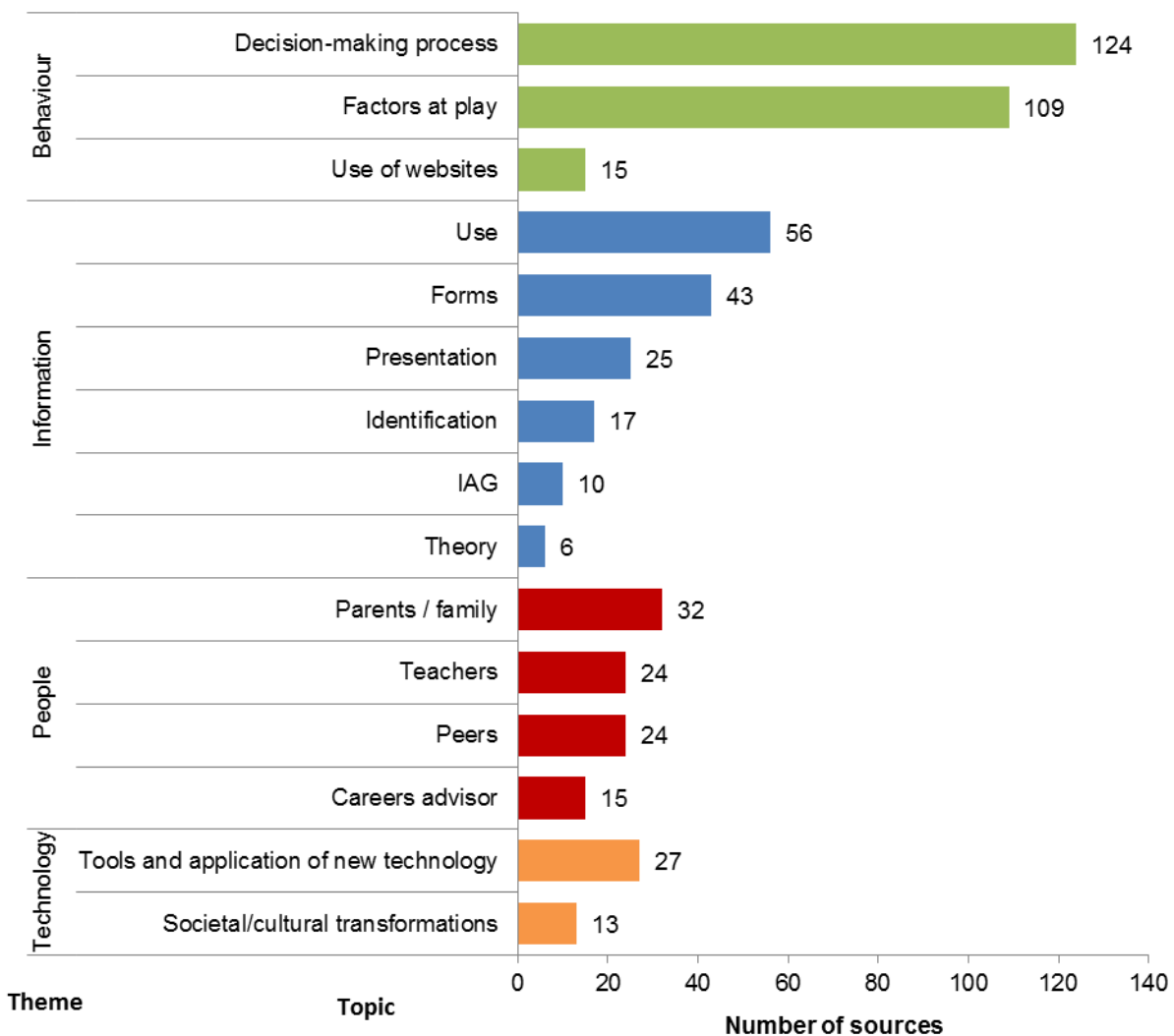


Figure 1: Detailed categorisation of literature (number of sources per topic, grouped by theme).

1.2.4 Literature Synthesis

Following the selection and categorisation of literature according to subject, findings from the sources were extracted and grouped together to address specific research questions. Any further gaps in information were supplemented with an additional literature search. The synthesis of knowledge from these various fields of study provides the foundation for the present report.

1.3 Report Structure

This report is structured as follows: [Chapter 2](#) briefly introduces the different areas of study with regard to information, and provides a broad background to the research in general. [Chapter 3](#) introduces behavioural aspects of information use, and explains why this focus is relevant to the present study. It outlines the key terms and principles before considering applications of behavioural principles to the development of public policy and the provision of information. [Chapter 4](#) outlines how people seek information within the social and environmental contexts that influence and constrain decision-making. [Chapter 5](#) considers the effects of different sources of information and the various strategies people employ to engage in effective information seeking, while [Chapter 6](#) outlines how people make decisions. Finally, in [Chapter 7](#), the report provides some guiding principles for the commissioning partners to consider in their ongoing review of information. This final chapter also identifies areas for further research.

Additional material is presented at the end of this report in appendices. [Appendix 1](#) lists the literature search terms, whilst [Appendix 2](#) describes the process of literature classification and analysis. [Appendix 3](#) presents evidence for the benefits of data visualization. Finally, [Appendix 4](#) is a glossary of abbreviations.



CHAPTER 2: UNDERSTANDING INFORMATION

Here we introduce the different fields of study that have informed this report, specifically with regard to the subject of information.

2.0 Chapter 2 Summary

Information as a concept can be explored through several disciplines and applied in diverse ways. To provide a foundation for the present report, we first examine literature that can help to clarify what information is and how it is used within the context of HE. The literature review reveals that a wide range of fields can inform the subject of information in HE.

The field of information theory is important because it has helped to lay the foundations of our understanding of information and provides the basis of today's ubiquitous digital technology, but alone it cannot answer questions about the ways in which people deal with information. Questions that focus on the human aspects of information use are better addressed by behavioural studies. Psychological studies of behaviour are being used to develop new economic theories that account for the way that people actually behave. Whereas information science, economics and sociology support research into the objective and external aspects of information behaviour, psychology offers a complementary body of knowledge that deals with subjective and internal aspects of information processing. Together, these fields of study constitute a wide-ranging body of knowledge that can aid our understanding of information use in HE decision-making. The influences on information behaviour can be categorised into three groups: behavioural (dealt with in Chapter 3), and social and environmental (Chapter 4).

2.1 An Introduction to Information

Information is a very broad subject, because it comprises one of the three major components that make up the universe in addition to matter and energy: "Information is neither matter nor energy, but it needs matter for its embodiment and energy for its communication."⁴ The immaterial nature of information makes it a difficult object of study, but its presence is indicated by the amount of technology and energy used for creating, storing and processing it. In this 'information age', the term is widely used but it is also understood in very different ways, depending on the approach used to study it and the applications it is put to.

⁴ The Information Philosopher, <http://www.informationphilosopher.com/introduction/information/>.

This introductory chapter takes brief look at some of the ways in which the understanding of information has developed, in order to provide a theoretical foundation for this research. It serves the dual purpose of identifying fields of study that inform the current report and providing the terminology to do so. It maps out the domains of knowledge that can contribute to understanding information use in HE, and shows how these different fields of study relate to each other. In the following paragraphs, the fields of study are highlighted in **bold text** and key terms are highlighted by underlining.

2.1.1 Conceptualising and Measuring Information

Information philosophy tackles the subject from a historical and systematic perspective, aiming to understand the nature of information or applying that understanding to philosophical problems. It deals with questions about the extent to which information can or should be defined in terms of structure, usefulness and truth.⁵ For example, the information contained in a map represents the geographical features that are most useful to us in navigating the terrain. Gregory Bateson defined a unit of information as “a difference that makes a difference”.⁶ The philosophical study of the concept of information can be understood as an effort to make this knowledge measurable.⁷

The measure of information developed by Claude Shannon (1948) established the field of **information theory**.⁸ In this quantitative measure of information, the fundamental unit of measurement is the ‘bit’ (short for ‘binary digit’). Shannon conceived information in terms of probability, and the acquisition of information is understood as a reduction of uncertainty. Shannon’s measure quantifies this uncertainty as information ‘entropy’ (a term denoting ‘disorder’, appropriated from physics). For example, the outcome of a coin-toss reduces the uncertainty that exists before the toss by one bit (because there are two possible outcomes with equal probabilities – ‘heads’ and ‘tails’ – and because one bit is sufficient to represent the outcome, which can be represented either as a ‘1’ or a ‘0’).

The opposite of information entropy is ‘redundancy’ – that is, repetition and predictability. Shannon’s theory shows how a certain amount of redundancy in a message allows for it to be sent along noisy transmission lines, and it enables communications engineers to work out the information capacity of a transmission channel.⁹ The redundancy of written languages, for example, means that we can still make sense of a message even if some letters or words are omitted. The theory also led to methods of compressing information by reducing redundancy so that more could be sent or stored within the same capacity. This

⁵ Case, D.O. (2012). *Looking for Information: A Survey of Research on Information Seeking, Needs and Behaviour*. Bingley: Emerald.

⁶ Bateson, G. (1972). *Steps to an Ecology of Mind*. New York: Ballantine.

⁷ Adriaans, P. (2013). ‘Information’, *The Stanford Encyclopaedia of Philosophy* (Fall 2013 Edition), Edward N. Zalta (ed.), <http://plato.stanford.edu/archives/fall2013/entries/information/>.

⁸ Shannon, C.E. (1948). A Mathematical Theory of Communication. *Bell System Technical Journal*, 27: 379–423; 623–656.

⁹ Redundancy makes a message more robust to perturbation by noise because if parts of the message are lost or corrupted through transmission its meaning can still be determined.



mathematical understanding of information proved especially useful to the fields of computer science and cybernetics which are, in effect, examples of applied information theory.

2.1.2 The Limitations of Information Theory

Although Shannon's mathematical approach to information proved to be important to computing and telecommunications, its application to other fields of study has had mixed success. For example, experimental psychologists enthusiastically found new applications for the theory, but these were limited to situations where information could be quantified. The quantitative measure of information entropy is limited because it focuses on the objective properties of messages (the number and arrangement of symbols, for example) and disregards the subjective meaning of symbols and the interpretation of messages.

Thus, information theory is a restrictive approach because its quantitative basis means that it fails to address questions concerning the meaning of information. This brings us to a significant distinction to be made between different types of information: in one of the earliest applications of information theory to psychology, Abraham Moles (1966) noted that whereas some messages principally transmit semantic information, others involve the transmission of aesthetic information.¹⁰ This distinction is useful to articulate the ways in which different types of information influence the behaviour of people deciding whether to enter HE.

In summary, information theory has provided a quantitative measure of information that laid the foundations for today's computing and communications technologies and which supports the World Wide Web. But this quantitative approach to information is less able to answer questions about how people seek and use information or how information systems can be improved. The following section introduces the fields of study that aim to answer this type of question.

2.2 Information and the Social Sciences

2.2.1 Information Science

While the field of information theory provides an important starting-point for understanding information, it is too restrictive an approach to be of much use to the subject of HE decision-making. This is because it cannot answer research questions concerning which types of information are used and for what purposes. However, the field of **information science** is largely applicable to information provision in HE because it deals with the analysis, storage and dissemination of information.¹¹ As such, information

¹⁰ Moles, A. (1966). *Information Theory and Esthetic Perception*. London: University of Illinois Press.

¹¹ Case, D.O. (Ed.) (2012). *Looking for Information: A Survey of Research on Information Seeking, Needs, and Behaviour*. 3rd edition. Bingley: Emerald.

science is a broad interdisciplinary field that incorporates knowledge management, computer science, library systems and the social sciences.¹²

The field of information science aims to understand the range of activities relating to the acquisition and use of information. It refers to this range of activities as information behaviour, which encompasses:

- information seeking (intentional)
- unintentional or passive behaviours (such as accidentally encountering information)
- purposive behaviours that do not involve seeking (such as actively avoiding information)¹³

Because of the broad scope of information as a subject and the great number of areas to which it applies, information science is a rather fragmented field of study that brings together diverse approaches, not all of which can be classed as scientific. Nevertheless, this is a fruitful area for the present study because it deals not only with objective aspects of information storage and retrieval, but also with subjective information needs that can be satisfied by information seeking or (more broadly) information behaviour. It also provides models of decision-making that describe or explain how observed information behaviour addresses information needs.

2.2.2 Information Behaviour

Information behaviour can be understood through a variety of approaches, and is closely related to studies of **decision-making**. Research into decision-making can be seen either as a part of information science or as a discrete subject in itself, since the two subjects are closely intertwined but also clearly separable. This area of research is also related to the study of problem-solving, because solving problems usually involves both information-seeking and decision-making.

The traditional model of decision-making is rational choice theory, which is a framework for understanding social and economic behaviour. The field of **economics** offers a wealth of knowledge on the production and consumption of goods and services, but some of its traditional theories have begun to be questioned. The concept of utility underpins the theory of decision-making in economics. While there are different formulations of this concept we can largely think of utility as a measure of the person's overall well-being. Traditional economics is dominated by expected utility theory, which is based on the assumptions that decision-makers operate with complete knowledge and with unlimited capacity to evaluate benefits and costs in order to maximise utility over their lifetime, subject to the constraints of time and money. This model fails to account for much of the

¹² The aims and scope of the journal Information Sciences provides a brief summary of its diverse approaches: <http://www.journals.elsevier.com/information-sciences/>.

¹³ Case, D.O. (2012). Op. cit. p. 5.



observed behaviour of people in the real world, in which deviations from the expectations of rationality are commonplace.

More recently, empirical studies of economic behaviour have undermined these assumptions and rejected that model. In its place, a new type of behavioural economic theory is being established, in which the problematic assumptions are replaced with empirically tested understanding from psychology. **Cognitive psychology** contributes to understanding the mental processes involved in information use, whilst **behavioural psychology** studies the physical manifestations of those processes. The psychological field that studies behavioural decision-making is divided into research that focuses on judgement or on choice. Judgement deals with how people estimate probabilities, whilst choice relates to the way in which people use those judgements to select possible actions.

Behavioural economics is informed by this psychological understanding. It comprises a collection of principles or effects (such as the “framing effect”) that explain observed behavioural patterns (e.g. “loss aversion”) that cannot be explained by traditional economic models. Behavioural economics offers a modification to the model of a purely rational decision-maker, by recognising that our capacity for rationality is bounded and that our decision-making is also characterised by behaviour that traditional economic models would define as non-rational. Behaviourally informed studies have successfully informed marketing and advertising practices,¹⁴ and have more recently been applied to policy development¹⁵ and student choice.¹⁶

The application of insights from psychology and behavioural economics is increasingly pertinent to understanding the provision of information about HE. This is not least because the Government’s reforms to HE funding have seen the sector operate increasingly like a marketplace, in which students are consumers of HE ‘products’. As a consequence **consumer-oriented studies**, particularly where they refer to information use in decision making, also have the potential to inform the debate. We therefore draw upon such material where it can be deemed applicable to the HE context.

2.3 Conclusion

The influences on information behaviour can be categorised into three groups: Personal (or psychological/behavioural), social, and environmental. Wilson’s (1997) general model of information-seeking behaviour recognises that decision-making is influenced by each of

¹⁴ Ignition Consulting Group (2013). What you should know about behavioural economics. <http://www.ignitiongroup.com/cognition/guides/What-you-should-know-about-behavioral-economics/>.

¹⁵ For example, the Government’s Behavioural Insights Team: <https://www.gov.uk/government/organisations/behavioural-insights-team>.

¹⁶ Diamond et al. (2012). Behavioural Approaches to Understanding Student Choice. HEA/NUS. http://www.heacademy.ac.uk/resources/detail/evidence_informed_practice/Student_Choice.

these three areas, which comprise the context in which information needs arise.¹⁷ Figure 2 shows how these elements relate to each other: personal attributes are conceived as being located within a wider sphere of social influence, which are in turn located within a broader environment that includes the physical aspects of places.

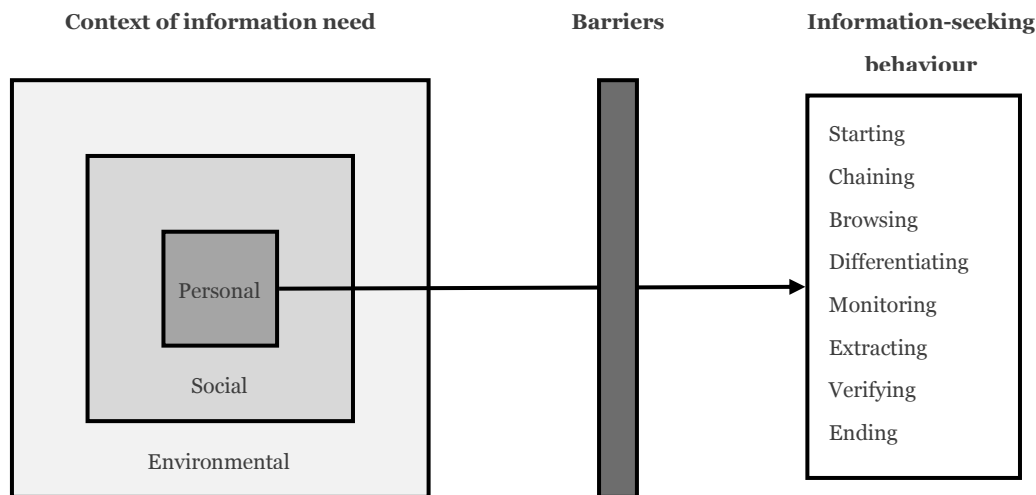


Figure 2: Wilson’s (1997) model of information behaviour

This simple model illustrates the inter-relationship of the psychological, social and environmental spheres of influence. Each of these aspects not only influences information-seeking behaviour, but each also presents its own kind of barrier or enabler to decision-making. For example, personal characteristics (whether a person is a satisficer or maximiser¹⁸, for example) may impact upon the thoroughness of information searches; social pressures may reduce opportunities (via issues relating to gender, wealth or family background); and environmental factors (such as proximity to home) also have a bearing on choices and on decision-making. These factors interact in complex ways, but the following chapters examine the ways in which they individually contribute to shaping the needs and uses of information pertaining to HE choices.

The present chapter has identified the fields of study that have the potential to inform understanding of information use relating to decision-making about HE. Next, Chapter 3 looks at information behaviour and, following that, Chapter 4 considers the social and environmental influences.

¹⁷ Wilson, T. D. (1997). Information Behaviour: An Interdisciplinary Perspective. *Information Processing & Management*, 33(4): 551–572.

¹⁸ See chapter 3 for a description of satisficers and maximisers.



CHAPTER 3: UNDERSTANDING INFORMATION BEHAVIOUR

Here we focus on knowledge from behavioural studies of information use, and identify insights that can contribute to understanding prospective HE student choice.

3.0 Chapter 3 Summary

Theories of human behaviour derived from traditional economics are based on assumptions about why people act as they do. These assumptions say that people behave rationally on the basis of having complete and accurate information, which allows for a full analysis of costs and benefits. In contrast, a new approach to economic understanding has been developed based on evidence of how people actually behave. Evidence from behavioural studies is building on traditional economic assumptions to provide a more sophisticated account of behaviour.

This new field of **behavioural economics** recognises that people often make decisions on the basis of partial information and under conditions of uncertainty. It also accepts that people frequently behave in ways that would be described as ‘non-rational’ in terms of traditional economic understanding. In contrast to traditional economic theory, the ways in which people’s behaviours deviate from rationality are not random, but conform to predictable patterns. Non-rational behaviour usually leads to more errors than fully rational analysis, but it is often wrong in predictable ways. This allows behavioural economists to formulate principles that account for observations of behaviour that deviate from rationality and which therefore can potentially provide a more nuanced description of observed behaviour. For providers of information about HE, understanding behavioural principles may offer a route to enable a more informed and reflexive approach to student decision-making.

3.1 Fundamental Concepts in Behavioural Economics

Before approaching the subject of behavioural economics directly, it is worth setting out a brief description of economics in order to understand how a more behaviourally informed approach is able to address some of the shortcomings of traditional economic theory. Economics is a field of study within the social sciences that deals with the allocation of resources. Traditional economic theories are built upon a set of assumptions about the way people behave. For example, many of these theories utilise the central concept of a model human (known as Homo economicus or ‘economic man’), which assumes that people always act rationally and in their own self-interest. It also assumes that people are capable of making optimal decisions that are based on having sufficient relevant information.

However, there is a growing body of evidence from behavioural studies that suggests this model is unrealistic. The application of knowledge from behavioural psychology to economic problems has led to the development of **behavioural economics**, which attempts to improve the explanatory power of economics by providing it with more realistic psychological foundations.¹⁹

Behavioural economics is best characterised not as a single specific theory but as a commitment to empirical testing of the neoclassical assumptions of human behaviour and to modifying economic theory on the basis of what is found in the testing process.²⁰

Today, these behaviourally informed theories are finding applications in a number of areas, such as policy-making and the design of information systems. The following sections outline a few of the foundational concepts that have contributed to the establishment of behavioural economics. These concepts will be useful in the following discussion of decision-making behaviour and information use in the context of HE.

3.1.1 Bounded Rationality

One of the earliest contributions to behavioural economics was made by Herbert A. Simon who, in 1955, challenged one of the fundamental assumptions of neo-classical economics.²¹ This was the idea that people always behave rationally. Simon undermined this assumption with evidence that people rarely have access to complete and accurate information, and they do not have an unlimited capacity for information-processing. Furthermore, they may choose to act altruistically rather than for selfish reasons. As a result, people frequently deviate from what traditional economics defines as ‘rational’ behaviour. Simon called this bounded rationality.

In addition to the limitations of our cognitive faculties, our decision-making is often constrained by other resources – such as the amount and quality of information and the time permitted to evaluate the options. These limitations also mean that people are unable to act with complete rationality. Simon noted that in these cases people make decisions that are merely satisfactory, instead of the optimal outcome that maximises utility. To describe this type of non-rational behaviour, Simon coined the term ‘satisficing’ (in contrast with ‘optimising’). He argued that this ostensibly non-rational behaviour could be understood as being rational in the context of complex decisions. Behavioural economics goes further than this, however, showing that people can violate the assumptions of rational choice theory even when the decision in hand is a simple one. Thus, bounded rationality is insufficient as an explanation for all deviations from rational behaviour, but it is a useful description of the way in which people actually deal with information because it

¹⁹ Camerer, C.F. & Loewenstein, G. (2002). Behavioural Economics: Past, Present, Future, <http://www.hss.caltech.edu/~camerer/ribe239.pdf>.

²⁰ Simon, H.A. (1997). Models of Bounded Rationality. Volume 3: Empirically Grounded Economic Reason. Cambridge, Massachusetts: MIT Press. p. 278.

²¹ Simon, H.A. (1955). A Behavioural Model of Rational Choice. The Quarterly Journal of Economics, 69(1): 99–118.



recognises that rationality is always bounded by our habits, heuristics and emotions, as well as by time and money. The following section explains what heuristics are and how they affect information behaviour.

3.1.2 Heuristics and Biases

Many of the useful findings from behavioural economics can be summarised as principles or effects that apply in certain circumstances. These findings provide useful guidelines that have successfully informed consumer-oriented activities such as marketing and advertising, and which may also relate to the use of information in HE.

3.1.2.1 Judgements under Uncertainty

The psychologists Amos Tversky and Daniel Kahneman studied the way in which people make decisions when the potential outcomes are uncertain. Tversky & Kahneman's (1974) pioneering article reveals that people rely on a limited number of heuristics (rules of thumb) which reduce the burden of complex decision-making tasks, but which can lead to systematic errors or biases.²² The fact that these heuristics lead to predictable biases contradicts the assumption of neo-classical economics that deviations from rationality are random (unpredictable).

When faced with a difficult problem, people use heuristics to obtain an approximate answer quickly, but this leads to predictable errors. For example, people's estimations are affected by the way in which information is presented to them, being more heavily influenced by the first piece of information supplied: Tversky & Kahneman tested two groups with the task of estimating the product of multiplying a set of numbers. Presenting the numbers in ascending order led to lower estimates than when the same numbers were presented in decreasing order.²³ This experiment showed that the first piece of information has an anchoring effect on estimations. The article also shows how judgements of probability are biased by the representativeness heuristic, which is employed when people make judgements in which probabilities are evaluated by the degree to which A is representative of (or similar to) B.²⁴ The availability bias describes how judgements are affected by the ease with which relevant information comes to mind; judgements are biased because more readily-available information is assigned higher probability. As a result, prospective students may, therefore, become over-reliant upon pieces of information that are more 'available' in the mind (such as information about tuition fees) or on certain familiar cases (such as their peers' experiences) or views expressed in forums.

²² Tversky, A. & Kahneman, D. (1974). Judgements under Uncertainty: Heuristics and Biases. *Science, New Series*, 185(4157):1124–1131.

²³ In this case, one group estimated the product of $1 \times 2 \times 3 \times 4 \times 5 \times 6 \times 7 \times 8$ whilst the other estimated the product of $8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1$. The average estimate of the first group was 512 and the second was 2,250. The presentation of higher numbers first in the second group led to predictably higher estimates. Neither answer was even close, however; the correct answer is 40,320.

²⁴ "For example, when A is highly representative of B, the probability that A originates from B is judged to be high. On the other hand, if A is not similar to B, the probability that A originates from B is judged to be low." (Tversky & Kahneman, 1974, p. 1124).

Another set of experiments by Tversky & Kahneman (1979) similarly used empirical evidence to propose an alternative to the neo-classical expected utility theory.²⁵ Whereas the traditional theory claims that decisions are based on probabilistic estimates of expected outcomes, prospect theory states that decisions are evaluated in terms of gains and losses compared to the current situation, and that these are evaluated asymmetrically. Loss aversion suggests that people tend to dislike losing a given quantity of a commodity more than they would like to gain the same amount.

These findings have implications for the decision whether to enter HE, because it involves estimates of gains and losses based on the costs of student finance and expected returns on investment. Therefore, the implication for information about HE is that student choice is a form of decision-making under uncertainty because neither the costs nor the benefits of various options can be known with complete confidence. Furthermore, estimates of gains and losses will depend on many factors that lie outside of the person's control and which cannot be known in advance (for example, future employment prospects and expected salary).

3.1.2.2 Thinking Fast and Slow

The way in which heuristics involve a rough-and-ready process of estimation, in contrast with more deliberate and accurate reasoning, has been summarised by Kahneman as a dual-process theory of judgement. This describes heuristics as a form of intuitive judgement that contrasts with more deliberate reasoning. Kahneman's recent best-selling book, *Thinking, Fast and Slow*,²⁶ elaborates the distinction between these two ways of thinking, labelling them System 1 and System 2:

System 1 operates automatically and quickly, with little or no effort and no sense of voluntary control.

System 2 allocates attention to the effortful activities that demand it, including complex calculations. The operations of System 2 are often associated with the subjective experience of agency, choice and concentration.²⁷

Many of the behavioural influences described above operate largely within System 1. Both systems operate when we process information and make decisions, but because System 1 is automatic, it can have a powerful influence on decision-making. It is partly because we are rarely conscious of its influence that it has the ability to bias our judgements. Because the thought processes of System 1 operate below the level of consciousness, they are difficult to uncover from traditional survey methods such as asking people what influenced them or why they made a particular decision. This is one reason why experimental methods are a

²⁵ Kahneman, D. & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(4): 263–292.

²⁶ Kahneman, D. (2011). *Thinking, Fast and Slow*. London: Penguin.

²⁷ Kahneman (2011). These systems are simplifications of brain function; Kahneman stresses that “the two systems do not really exist in the brain or anywhere else” (p. 415).



popular technique in behavioural research. It is also important to stress here that while “people do not always have well defined preferences; they nevertheless latch on to ‘reasons’ for acting that can make their actions intelligible and predictable”.²⁸ Again, this process of post-decision rationalization casts doubt on the usefulness of ex-post survey analysis to help us understand information use and decision-making, and yet most of the empirical literature on HE decision-making relies on these methods.

3.1.3 Information Overload and the Paradox of Choice

3.1.3.1 Information Overload

Standard economic theory tends to assume that increasing information and increasing choice are unambiguously good things. In contrast, research from information science, consumer psychology and behavioural economics show there are limits to the amount of information we are able to process. The result of these limitations is that as the number of information items increase, or as the amount of available time decreases, people tend to abandon deliberate and careful reasoning. Instead, they resort to simpler and less reliable rules of thumb for making choices, which makes the decision-making process more prone to errors and biases.²⁹

In *Future Shock* (1970), a study of Western consumerism and post-industrial society, Alvin Toffler popularised the term “information overload”.³⁰ This condition is caused when the volume or rate of information exceeds the bounds of rationality and becomes problematic. In contemporary psychological terminology, the mental burden of processing information is known as cognitive load. Cognitive load can be understood as being proportional to the number of alternatives that need to be examined multiplied by the number of attributes to be considered. This simplistic equation suggests that an increase in the number of alternatives (for example, the number of universities or courses being compared) has the same effect as an increase in attributes (information about tuition fees, living costs, student satisfaction, etc.). However, behavioural studies show that cognitive load increases more strongly with increases in the number of attributes than with increases in the number of alternatives.³¹ One of the risks of information overload is that prospective students may defer decisions or disengage entirely if things become too complex.

A similar issue is the condition of information anxiety, which may be understood as one of the effects of information overload. Richard Saul Wurman, who coined the term, suggests that information anxiety is produced by the gap between data and knowledge, which

²⁸ Hargreaves Heap, S.P. (2013). What is the meaning of behavioural economics? *Cambridge Journal of Economics*, 37: 985–1000.

²⁹ Katopol, P.F. (2005). Library anxiety. In: K. E. Fisher, S. Erdelez & E. F. McKechnie (Eds). *Theories of information behaviour* (pp. 235-238). Medford, NJ: Information Today.

Prabha, C., Connaway, L. S., Olszewski, L., & Jenkins, L. R. (2007). What is enough? Satisficing information needs. *Journal of Documentation*, 63(1): 74–89.

³⁰ Toffler, A. (1970). *Future Shock*. New York, NY: Random House.

³¹ Case, (2012). *Op. cit.*, p. 97.

“happens when information doesn’t tell us what we want to know”.³² It is not only a lack of information that contributes to information anxiety, though, since W.R. Garner suggests that being unable to perceive any meaningful patterns in data may also produce considerable discomfort.³³ The implication of these findings for HE information provision is that prospective students should be afforded unimpeded access to relevant information, and that information should be structured in a way that makes it possible to identify meaningful patterns in the data.

3.1.3.2 The Paradox of Choice

While traditional economics assumes that more choice is always good, sometimes, when presented with a large set of options, we will avoid a choice altogether, or choose the status quo. Even if we do make a choice, having more options can also reduce the amount of ex-post satisfaction we derive from that choice. Toffler (1970) called this condition “overchoice”, stating that it happens when “the advantages of diversity and individualization are cancelled by the complexity of the buyer’s decision-making process”. More recently, the social psychologist Barry Schwartz has called this effect ‘the paradox of choice’.³⁴ Together with the increasing expansion of HE in terms of both student population and the number of higher education institutions (HEIs) and courses, the increasing marketisation³⁵ of HE means that the paradox of choice is a pressing issue for people who are facing the decision whether to enter HE.

The paradox of choice has important implications. Research on decision-making typically focuses on examining the rules that people use to make choices. However, whatever the rule, people often (and to varying degrees) satisfice.³⁶ Schwartz describes a continuum, from satisficing to maximising, and people tend to have psychological traits that place them along this continuum. Some are maximisers who need to be sure that every decision is the best possible one that can be made, and so search out all possible alternatives; while some are satisficers who settle for a ‘good enough’ choice, without worrying whether there is something better available. At some point an individual decides that they have enough information to stop searching and make a decision. For satisficers this point comes earlier than for maximisers. Furthermore, increasing choice not only increases the complexity of making the decision but it also tends to reduce the level of satisfaction people have with that decision after the fact, with the amount of regret larger for maximisers than satisficers.³⁷

³² Wurman, R.S. (1989). *Information Anxiety*. New York, NY: Doubleday.

³³ Garner, W.R. (1962). *Uncertainty and structure as psychological concepts*. New York, NY: Wiley.

³⁴ Schwartz, B. (2004). *The Paradox of Choice: Why More Is Less*. London: Harper Collins.

³⁵ In this context, ‘marketisation’ has been defined as the application of economic theory to the provision of higher education. See: ‘Everything for Sale? The Marketisation of UK Higher Education’ (2013) by Roger Brown.

³⁶ Simon, H.A. (1956). Rational Choice and the Structure of the Environment. *Psychological Review*, 63 (2): 129–138.

³⁷ Schwartz, B. (2004). *The paradox of choice: Why less is more*. London: Harper Collins.



Within the HE literature on student choice, for example, Christie and Munro (2003) argue that potential students full information about their subject of investigation and/or do not use the information that is available anyway.³⁸ Greenbank (2011) identifies the role that networks play in career decision-making by analysing students' rationale for utilising particular forms of social capital and how they respond to interventions aimed at influencing their attitude to different sources of information.³⁹ Greenbank finds that there remains reluctance among prospective students to engage with unfamiliar sources of information coupled with a lack of proactivity, leading to a failure to use high quality sources of advice. Furthermore, as Roger Brown (2007) states, "few students have the interest, the energy or the expertise, to usefully interrogate [information about HE]".⁴⁰ In relation to information about the quality of HE courses, Brown argues that in fact "there is no way in which valid and reliable information about comparative quality can be provided in the mass and diverse higher education system that we now have". Brown calls this "the information fallacy".

3.2 Other Principles in Behavioural Economics

3.2.1 The MINDSPACE Framework

A report produced by the UK Government Cabinet Office Behavioural Insights Team offers a mnemonic framework that categorises behavioural influences on decision-making.⁴¹ The MINDSPACE framework, a set of behavioural principles as explained below, was developed in order to inform a new approach to policy-making and provision of public services.⁴² It has also been used previously to describe and understand the influences on student choice in the UK.⁴³ Below, we briefly outline these behavioural principles and their relevance to HE choice.

Messenger: It is not simply information itself that determines our decisions; we are also heavily influenced by who communicates the information. We may act more readily on information if we perceive the messenger to be authoritative. Information can also be more effective if there are demographic and behavioural similarities between the messenger and recipient. Given the complexity of the student choice context, information from different messengers will have varying influence on prospective students – parents, friends, teachers, careers advisors, alumni, current students and lecturers.

³⁸ Christie, H. & Munro, M. (2003). The Logic of Loans: students' perceptions of the costs and benefits of the student loan. *British Journal of Sociology of Education*, 24(5).

³⁹ Greenbank, P. (2011). 'I'd rather talk to someone I know than somebody who knows' – the role of networks in undergraduate career decision-making. *Research in Post-Compulsory Education*, 16(1): 31–45.

⁴⁰ Brown, R. (2007). The Information Fallacy. Available at: <http://www.hepi.ac.uk/files/TheInformationFallacy-RogerBrown.pdf>.

⁴¹ Dolan, P., Hallsworth, M., Halpern, D., King, D., & Vlaev, I. (2012). *Influencing Behaviour through Public Policy*. London: Cabinet Office. Available at: <http://www.instituteforgovernment.org.uk/our-work/better-policy-making/mindspace-behavioural-economics>.

⁴² See: <https://www.gov.uk/government/organisations/behavioural-insights-team>.

⁴³ Diamond et al., (2012). Op. cit.

Incentives: Our responses to incentives are shaped by predictable mental shortcuts. Prospect theory is the behavioural economics alternative to expected utility theory. Two aspects are of key importance in HE choices. Most of us dislike losses more than gains of the same amount, i.e. we are loss averse. Because we tend to think in terms of losses and gains rather than final states of wealth, our starting position (or reference point) is of fundamental importance. Reference points mean that we are better at making relative rather than absolute judgements. For example, potential students often assess the value of fees and support in relation to their current situation and that of their peers.

Norms: We are strongly influenced by what others do. Social and cultural norms frame behavioural expectations within groups. The power of norms comes from the social penalties of non-compliance and/or the social benefit of conforming. Norms are related to sociological status attainment models in which students choose according to what is expected of them; they are heavily influenced by a given set of norms and values, which are dependent on their constituent group. For example, norms can help to explain the relatively low rates of university attendance among poorer high achieving students.

Defaults: Many decisions have a default option even if we do not explicitly realise it, and our tendency is to go with this pre-selected option if we do not make an active choice. Opting for defaults is a way of limiting our choice set and is a response to complexity. Default actions are likely to differ by socio-economic group, as well as by other factors like gender or ethnicity. They closely relate to norms in that for some groups the default action may be to not enter HE whereas for other groups the default is to enter HE. For mature learners for example, the 'default' might be to remain in their current employment whilst studying and or not to study at all.

Salience: We use a range of coping strategies to manage the volume of information that we are subject to. The more a message is salient to us the more powerful it is likely to be. We are more likely to be drawn to information that we can easily understand, that seems novel and that we can relate to from our own personal experience. Unusual or extreme experiences or information are also more likely to be influential than run-of-the mill ones. This is closely linked the idea that we are over-reliant on what is more 'available' in the mind: we tend to overestimate the risk of dangers that come easily to mind (such as a widely reported crime in a student area, for example) and underestimate the dangers of those that are less obvious. We also tend to generalise from our limited personal experience and, in the case of prospective students, from peers and friends.

Priming: Our acts are influenced by unconscious cues, so our behaviour may be altered by prior exposure to certain sights, words or sensations. Priming does not have to be subliminal; it can be very explicit. There is very strong evidence for priming from experimental studies but it is hard to relate these to HE choices. Nevertheless, it is clear that priming is likely to influence how students and their parents view information about HE and the experience.



Affect: Emotion is a rapid and automatic ('System 1') response over which we have little control. Our emotional reactions to certain events and images can have a significant impact on our decision-making. With regards to student choice, students' emotional reaction to what they observe at events such as open days could potentially have an overriding influence on their decision-making, with available information and data not being fully utilised in the process. It has been observed that the final selection of a university often comes down to a spontaneous and uncontrolled sense that it feels right.

Commitments: Our preferences are inconsistent across time and context, which often leads us to procrastinate and delay taking decisions that are likely to be in our long-term interests. The more effort a choice takes the more likely we will procrastinate. Evidence from the US shows that students are discouraged from applying for financial aid because the system is perceived to be complex; seemingly minor hurdles such as obtaining evidence of family income can deter students.

Ego: We act in ways that make us feel better about ourselves, supporting the impression of positive and consistent self-image. Decisions that contribute to self-esteem can be very powerful. If our behaviour and self-image (beliefs) are inconsistent, we are often more likely to change our beliefs than the behaviour itself. This challenges the common view that we should first seek to change attitudes in order to change behaviour; it is more likely that attitudes follow behaviour than vice versa. Our desire for a positive self-image contributes to our tendency to compare ourselves with other people. Little is known about the role of ego effects in HE decision-making, but they may have relevance to various areas. For example, fear of rejection from higher ranking institutions may discourage applications to these institutions, especially if this rejection is not completely private.

3.3 Applications of Behavioural Economics

The MINDSPACE framework was designed to apply behavioural principles to policy-making. Another example of political use of behavioural principles is Barack Obama's highly successful presidential election campaign, which was informed by behavioural experts including Richard Thaler and Robert Cialdini.⁴⁴ In the UK, the coalition government has established the Behavioural Insights Team (also known as the 'nudge unit') which aims to offer new approaches to policy development.⁴⁵

Like MINDSPACE, Nudge is a mnemonic framework that summarises the principles of behavioural economics and which aims to offer new approaches to influencing behaviour.⁴⁶ Economist Richard Thaler and lawyer Cass Sunstein's book, *Nudge* (2008), shows that the

⁴⁴ <http://www.nytimes.com/2012/11/13/health/dream-team-of-behavioral-scientists-advised-obama-campaign.html>.

⁴⁵ <https://www.gov.uk/government/organisations/behavioural-insights-team>.

⁴⁶ NUDGES stands for: iNcentives, Understanding mappings, Defaults, Give feedback, Expect error, Structure complex choices.

way in which choices are presented can affect behaviour.⁴⁷ They call the process of shaping choices “choice architecture”. The authors argue that choice architecture should be used to “nudge people to make better choices (as judged by themselves) without forcing certain outcomes upon anyone, a philosophy we call libertarian paternalism”.⁴⁸

The ideas behind Nudge are nothing new; the use of choice architecture in advertising and marketing is acknowledged by Sunstein & Thaler: “Behavioral economists have long looked at marketers and advertisers as people who have been applying behavioral principles for years.”⁴⁹ The ‘nudge’ approach has had some success in the area of public health: an increase in rates of organ donation was achieved simply by switching from an ‘opt-in’ system to an ‘opt-out’ system.⁵⁰ In contrast, the ‘Think’ approach by Gerry Stoker questions the Nudge approach to manipulating behaviour through choice architecture, suggesting instead that changing civic behaviour is better approached by encouraging reflection on the decision-making process.⁵¹ Another difference between the two approaches is that Nudge sees preferences and decision-making behaviour as being fixed, whereas Think views them as malleable.

3.3.1 Developing Reflexive Decision-Making

There is potential to use behavioural insights to improve HE decision-making by informing people about their tendencies and biases, therefore making them more reflexive. In this way, knowledge of the psychological and social factors that influence information behaviour may be used not only to understand the behaviour of others, but also to improve an individual’s ability to deal with information. A strong argument for this approach is put forward by the RSA’s Social Brain Project.⁵² This project aims to test the hypothesis that knowledge about how our minds work (including knowledge from behavioural economics and neurological science) might improve public engagement and the development of new policy. The RSA describe the purpose of the project as follows:

⁴⁷ Thaler, R. & Sunstein, C. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press.

⁴⁸ Thaler, R.H., Sunstein, C.R. & Balz, J.P. (2010). Choice Architecture. Available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1583509.

⁴⁹ Thaler, R.H. & Sunstein, C.R. (2011). Where is behavioral economics headed in the world of marketing? *Nudge*, 9 October 2011, <http://nudges.org/2011/10/09/where-is-behavioral-economics-headed-in-the-marketing-worlding>.

⁵⁰ Johnson, E.J. & Goldstein, D. (2003). Do Defaults save Lives? Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.173.2319&rep=rep1&type=pdf>.

⁵¹ John, P., Smith, G. & Stoker, G. (2009). Nudge Nudge, Think Think: Two Strategies for Changing Civic Behaviour. *The Political Quarterly*, 80: 361–370. Available at: <http://www.esrc.ac.uk/my-esrc/grants/RES-177-25-0002/outputs/read/2927dff6-060b-4a9e-8b36-be26df6a7fd5>.

⁵² Royal Society for the encouragement of Arts, Manufactures and Commerce, Social Brain Project: <http://www.thersa.org/action-research-centre/learning,-cognition-and-creativity/social-brain>.



Becoming more reflexive about our social and biological constraints, and cognitive frailties more generally, is the kind of transformative learning that we want to engender as widely as possible.⁵³

The idea is that instead of using behavioural understanding as a prescriptive approach to influence behaviour, the same knowledge could be shared with information-users to improve their decision-making process by helping them become more aware of their own tendencies and limitations, and by revealing the influence of other people and organisations. This approach would seem to fit the context of information provision in HE, where behavioural studies suggest that a prescriptive ‘one-size-fits-all’ approach to careers guidance is both inappropriate and ineffective.

Jonathan Rowson, one of the RSA’s Social Brain Project researchers, suggests that a middle path somewhere between these prescriptive ‘Nudge’ approach of Thaler & Sunstein and the ‘Think’ approach of Gerry Stoker may be useful for developing a more reflexive form of decision-making:

Both approaches have considerable power in certain contexts to shape certain aspects of our behaviour, but as general theories of behaviour change they have limitations. What is lacking is a model that is holistic, in the sense that it recognises that our controlled and automatic systems are intertwined and mutually reinforcing. [...] We also need an approach that is more reflexive in the sense that it recognises that having knowledge about our brains and behaviour literally changes the subject.⁵⁴

In the Social Brain Project, the RSA use Anthony Giddens’ notion of social reflexivity to support their proposal. Giddens explains the meaning of the term here:

Social reflexivity is both condition and outcome of a post-traditional society. Decisions have to be taken on the basis of a more or less continuous reflection on the conditions of one’s action. ‘Reflexivity’ refers to the use of information about the conditions of activity as a means of regularly reordering and redefining what that activity is.⁵⁵

Giddens conceived of our current “de-traditionalizing” society as an environment of “manufactured uncertainty” which is of our own making but which is also beyond our control (cf. the recent upheavals in global finance). The RSA suggest that “In a detraditionalising society people must become used to filtering all sorts of information relevant to their life situations and routinely act on the basis of that filtering process.”⁵⁶

⁵³ Rowson, J. (2011). Transforming Behaviour Change: Beyond Nudge and Neuromania. RSA. <http://www.thersa.org/action-research-centre/learning,-cognition-and-creativity/social-brain/reports/transforming-behaviour-change>.

⁵⁴ Rowson, J. (2010). Changing Behaviour Change. Left Foot Forward, 15 June. <http://www.leftfootforward.org/2010/06/changing-behaviour-change/>.

⁵⁵ Giddens, A. (1994). Beyond Left and Right — the future of radical politics. Cambridge: Polity Press. In: Rowson, J. (2011). Op. cit. p. 20.

⁵⁶ Grist, M. (2009). Changing the Subject: How new ways of thinking about human behaviour might change politics, policy and practice. RSA. Available at: <http://www.thersa.org/action-research-centre/learning,-cognition-and-creativity/social-brain/reports/changing-the-subject>.

The RSA's proposed approach to behaviour change is to help people shape their lives through an awareness of the ways in which their choices affect their actions and how those actions affect their choices. Besides the value of developing more informed decision-makers, the potential benefit of this approach for information provision relating to HE is that it might also enable people to increase their self-efficacy, and thus their satisfaction with the choices that they make.

3.3.2 Improving Decision-Making in Higher Education

Many of the public policy applications of behavioural economics have involved an attempt to influence behaviour in a certain direction. Policy-makers have tried to 'nudge' people toward more positive (or less negative) behaviour. This 'normative' approach is valid where there is an obviously desired behavioural outcome, such as encouraging people to exercise more, drink less alcohol or save more towards their pensions. It is less appropriate in the context of student choice, however, because there is no desire for a specific behaviour for everybody. Rather, the intention of HE information providers is to better inform decision-makers and empower people to make better choices for themselves. Note that we refer to 'better' choices here and not 'best' choices. It is important to recognise that while a 'best choice' (i.e. the one that maximises the individual's long-term utility) might exist theoretically, we are never in a position to know whether or not that choice has been made, because we can never establish the counterfactual situation (that is, what the person would have experienced if they had made a different choice).

In the provision of HE information, we wish to ensure that people can make good decisions for themselves. There may be no one 'best' decision for an individual in practice, but we can seek to reduce the effects of the systematic errors and biases discussed above, to help the person make a better choice for their own long-term well-being. For example, we know that people tend to have a very strong positive time-preference; this means that they prefer immediate gratification over postponed higher rewards. This is particularly relevant for HE choices in terms of student finance, because present cash-in-hand may be perceived as having much greater value than future earnings. The ways in which information on fees and borrowing and future potential earnings are presented could help to reduce our natural tendencies and encourage us to make a more informed comparison between current costs and future benefits.

The application of behavioural economics to HE involves awareness of the subconscious and automatic influences that bias the decision-making process of prospective students. Currently, the HE sector appears to place emphasis on student choice and information provision. This approach seems to rely on (or at least to imply) a view of students and other relevant decision-makers as rational, freely choosing agents who can effectively process all the information available to them and use it to make decisions that are in their own best interests. In other words, current understanding corresponds with the neo-classical theories of economics coupled with an increasing marketisation of the education system. Therefore, this traditional approach may fail to recognise a number of important



behavioural factors that have a strong influence on decision-making, with the risk of missing opportunities to provide more informed support for HE decision-making. In the context of complex, long-term, emotive decisions with uncertain future outcomes (such as those involved in a person's choice of university career), and which many people make only once in their lives, behavioural influences can result in choices that are not good for the person involved. This effect may have important consequences for the HE sector as a whole as well as for the broader economy and society.

3.4 Conclusion

Following the results of the literature analysis, which identified behavioural studies as a potential source of knowledge, the present chapter has reviewed many useful insights that illuminate the subject of information use about entry into HE. Studies informed by psychology are particularly valuable to this subject. Knowledge of the habits and limitations of cognitive processing is not only useful for understanding how people deal with information, but it also helps to explain patterns of observed behaviour. Behavioural studies have successfully informed new approaches to marketing, policy development, and healthcare. Our review of the available material suggests that this kind of knowledge has the potential to be useful for informing new approaches to the provision of information in HE as well. In particular, the following key points are highlighted as important in considering this field of study within a HE context:

- People do not have an unlimited capacity for information processing; therefore we can suffer from information overload.
- People rarely have access to complete and accurate information; therefore many decisions are not 'rational' or are at least partial.
- When there is too little or too much information (i.e. in conditions of uncertainty), people tend to rely on heuristics, which reduce the burden of complex information processing.
- Heuristics are a form of non-rational behaviour, and they are prone to bias and error.
- Student choice is a form of decision-making under uncertainty, because HE is a "post-experience good" which means that people cannot know the costs or benefits with enough certainty to make rational decisions.
- In place of or in addition to rational decision-making, emotional factors and non-rational choices often provide the basis for decisions about whether to enter HE and which course or university to attend.
- Recognising that it is impossible to know whether a 'best choice' has been made (due to the impossibility of knowing the outcome of an alternative choice), the role of HE information providers is to support decision-making and empower people to make better choices for themselves.

CHAPTER 4: SOCIAL AND ENVIRONMENTAL INFLUENCES

Here we explore how people seek information, and the social factors that influence and constrain decision-making.

4.0 Chapter 4 Summary

Knowledge developed in the field of sociology is useful to understanding the environment that influences information-seeking and decision-making. Sociological concepts such as field, habitus and cultural capital are useful for characterising these spheres of influence. There is evidence to show that social and institutional factors significantly influence both the way in which people engage in information-seeking behaviour, and how this impacts on decisions. We find that socio-economic background, school and key influential people constitute the environment in which choices about HE are considered, and these consequently affect the decision itself. As a result, there is a need for providers of information to engage, not only with prospective students, but also with those who shape their understandings and expectations. Varying reactions and attitudes among different groups mean that they require information to be presented in different ways.

4.1 Social Theory of HE Information and Decision-Making

According to Herbert Simon, the problem of understanding how people seek information to make decisions “can be approached initially either by inquiring into the properties of the choosing organism, or by inquiring into the environment of choice.”⁵⁷ The previous chapter examined the former approach, using the knowledge and techniques of behavioural psychology to explore the ways in which people gather and process information relating to HE. The present chapter considers the social environment in which information is sought and decisions about HE are made. It examines the characteristics of the HE decision-making environment and the inter-relations between decision-makers and other people in this environment. This subject is approached from a sociological perspective, which offers an understanding of how the physical, social and cultural environments affect the ways in which information is presented and used in the context of HE.

In the same way that rational choice theory has been rejected as a supporting framework for economics, researchers in sociology are also seeking alternative explanations of decision-making behaviour. While behavioural economics largely focuses on the agency of individual decision-making, sociology places more emphasis on the structures that form and constrain choices. In particular sociology is useful for understanding the mechanisms

⁵⁷ Simon, H.A. (1955). Op. cit., p. 100.



by which characteristics such as class, gender and race influence behaviour and relate to HE choice.

In the context of HE choice, the approaches of sociology and behavioural economics are highly complementary. In one of the most comprehensive works in this area, Reay, David & Ball (2005) set out a theoretical framework for examining choices in HE.⁵⁸ The way in which these authors describe HE decision-making accords with the perspective of behavioural economics described in the previous chapter, in that both approaches use the shortcomings of traditional economic theory as their point of departure:

The dominant model of decision-making is still that of rational choice theory in which students are perceived to be economic decision-makers. However, our data, particularly those from in-depth qualitative interviews, indicate that decision-making is often a messy process in which intuition, affective response and serendipity can play a greater role than rational calculation and systematic evaluation of the evidence available (Reay, et al.; 2005, p. xi)

4.1.1 Field, Habitus and Cultural Capital

Pierre Bourdieu's social theory (1967; 1986) provides an ontological foundation for sociological studies.⁵⁹ Bourdieu's theory is based on the three related concepts of field, habitus and cultural capital.⁶⁰ These three concepts, and the relationships between them, are complex, but nevertheless are useful in order to understand the dynamic processes that both enable and constrain choice.

Habitus has been a highly contested concept but Bourdieu uses it as a conceptual tool to link individual agency to structure. The relationship between agency and structure is dynamic, resulting from the backgrounds people come from (for example, their families and their schools) and the choices they make that determine their futures (for example, whether or not to go into HE and if so which type of institution and subject to choose). Therefore, habituses can be described as the complex psychological dispositions of people or groups that reflect the social context in which they develop. Sociologists working in the area of education, such as Reay et al. (2005), argue that educational institutions have identifiable habituses that influence the decision-making and attainment of prospective university applicants.

Cultural capital encompasses a range of endowments that people possess as a result of their social and family background. Reay et al. (2005) explain that these include more

⁵⁸ Reay, D., David, M.E. & Ball, S. (2005). *Degrees of Choice: social class, race and gender in higher education*. London: Institute of Education Press.

⁵⁹ Bourdieu, P. (1967). Systems of education and systems of thought. *Social Science Information*, 14: 338–358;

Bourdieu, P. (1986). The Forms of Capital. In: Richardson, J.G. (ed.) *Handbook of Theory and Research for the Sociology of Education*. Greenwood Press, New York, pp. 241–258.

⁶⁰ These three are the main elements of the theory in: Bourdieu (1984) *Distinction*. London: Routledge and Kegan Paul.

formal dimensions such as educational qualifications and participation in high status activities, as well as informal dimensions such as “levels of confidence, certainty and entitlement” (p.20). Cultural capital sits alongside economic capital (income and wealth), social capital (networks in the family and wider society) and symbolic capital (personal qualities such as authority and charisma) and all of these vary systematically with social class.

Field is the social setting where class dynamics take place, for example the classroom or the workplace. Field, habitus and cultural capital interact in a dynamic way and they help us to understand both the structure and agency of HE decision-making. Individual choices can either replicate or transform a person’s social position. So, for example, this may be replicated where a pupil from a higher socio-economic group considers only Russell Group universities as potential HE institutions; whereas it can be transformed where a high achieving working-class pupil chooses to study at Oxford or Cambridge. A person’s preferences are largely endogenous to their particular institutional and social context. This naturally points us towards sociological theories in order to more fully understand these contexts and the effects that they can have on HE choices.

4.1.2 Socioeconomic Background

In their study of prospective students from a variety of socio-economic backgrounds, Reay et al. (2005) point to the importance of both ‘hard’ constraints such as economic resources and access to information, as well as ‘softer’ constraints, such as the “subtle modalities of culture and language” (Bourdieu, 1977, p. 82),⁶¹ which can either open up or close off certain choices. It is also the case that preference formation is about forming an identity; for many potential students the formation of preferences around HE is a key element of their future identities. This may create tensions between their current situation or background and their future aspirations, and the sociological approach is more suited (than the economic one) to understanding the dynamic involved. Furthermore, evidence suggests that prospective students from lower socio-economic groups are more likely to choose universities based on their proximity to home,⁶² and are less likely to search for external information on universities.⁶³

Evidence suggests (Archer et al., 2007) that prospective students from working class backgrounds are heavily influenced in their decisions to attend university through the peer networks they are linked to.⁶⁴ This can have a significant impact depending on the

⁶¹ Bourdieu, P. (1977). Cultural Reproduction and Social Reproduction. In: Karabel, J. & Halsey, A.H. (eds.), *Power and Ideology in Education*. New York: Oxford University Press.

⁶² Callender, C. & Jackson, J. (2008). Does the Fear of Debt Constrain Choice of University and Subject of Study? *Studies in Higher Education*, 33(4): 405–429.

⁶³ Menon, M.E., Saiti, A. and Socratous, M. (2007). Rationality, Information Search and Choice in Higher Education: Evidence from Greece. *Higher Education: The International Journal of Higher Education and Educational Planning*, 54, no. 5, 705–721; Moogan and Baron. *An Analysis of Student Characteristics Within the Student Decision Making Process*.

⁶⁴ Archer, L., Hollingworth, S. & Halsall, A. (2007). 'University's not for Me — I'm a Nike Person': Urban, Working-Class Young People's Negotiations of 'Style', Identity and Educational Engagement. *Sociology*, 41(2): 219–237.



circumstance of the individual. Archer et al. (2007) state that working-class students, for example, do not believe university is for ‘people like us’, where university is seen to be for cleverer or ‘posh’ people. Although there has been less research into the decision-making processes of mature students, the data available suggests that cost and location are more significant for this group.

More recent research (Harrison & Hatt, 2011) suggests again that for students from lower socio-economic groups, elite universities are seen to be “not for people like us”, with highly-qualified students from poorer backgrounds not applying to top universities with the same tendency as those from wealthier backgrounds.⁶⁵ As a result social norms can impact on the relationship between the information presented, and decisions about which HEIs students from different socio-economic backgrounds apply to.

Kettley & Whitehead (2011)⁶⁶ claim that the influence of socioeconomic background is perhaps more subtle than both Archer et al. (2007) and Harrison & Hatt (2011) suggest. They claim that while social class can be a poor predictor of whether a person would decide to attend university or not, there are numerous factors that influence an individual’s ‘landscape of choice’, including improved career prospects, whether or not they are encouraged to attend, and the anticipation of the enjoyment of student life. However, while working-class parents were found to be supportive of their children's aspirations to go to university they often lacked the knowledge and practical experience, or the cultural capital, of how to make an application.

4.1.3 The Influence of Schools on the Transition to HE

Informed by the work of Bourdieu and others, Dunne, King & Ahrens (2013) illustrate the contrasts between state and independent schools to illustrate ways that school practices and processes influence the transition to HE.⁶⁷ They highlight the ways that social practices in independent schools concentrate on the development and accumulation of a range of social and cultural capitals to support the “symbolic and academic capital of high examination passes” (p. 16). Dunne et al. argue that, in contrast to state schools, independent schools assume a HE career for their students, and as a result they “invest more resources, start the process earlier, are more proactive in increasing their students’ capital and aspire to get their students into higher-status universities and courses” (p. 17). Similarly, across state schools HE applications appear to be less ambitious even for the high achieving students. In this regard, teachers’ practices and the careers advice (whether conscious or not) work to legitimise the cultural capital that structures relations within and between the educational and social hierarchies.

⁶⁵ Harrison, N. & Hatt, S. (2011) Expensive and failing? The role of student bursaries in widening participation and fair access in England. *Studies in Higher Education*, 37(6): 695–712.

⁶⁶ Kettley, N.C. & Whitehead, J.M. (2011) Remapping the “landscape of choice”: patterns of social class convergence in the psycho-social factors shaping the higher education choice process, *Educational Review*, 64(4), pp. 493–510.

⁶⁷ Dunne, M., King, R. & Ahrens, J. (2013). Applying to higher education: comparisons of independent and state schools. *Studies in Higher Education*. DOI: <http://dx.doi.org/10.1080/03075079.2013.801433>

It has been suggested that the influence and nature of pre-university interventions on working-class students has been under-explored.⁶⁸ For example, Tina Byrom (2009) uses the concept of habitus as a tool for explaining change in behaviour and attitudes; she argues that school-based institutional habitus and directed intervention programmes can be critical in guiding student choice relating to participation in HE. Through case studies of young people, Byrom highlights the high level of influence teachers can have on the aspiration of a student, concluding that school is “a clear determining component in the students’ choices and strategies” (p. 220). However, Byrom also states that

Although the determinants that make academic success possible contribute to a school ‘effect’, they are also part of a complex interaction between habitus and the various forms of capital. Students who succeed in education do so as a result of their dispositions towards learning and the way in which education systems support their progress (p. 221).

The implication of these findings is that those with the responsibility to provide information, advice and guidance relating to the decision whether to enter HE should recognise the social influence of institutions, as well as that of families and friends, in order to help identify pupils who would benefit most from interventions and support.

4.1.4 Key Influencers

People are often influenced by information from key people in their lives. Studies by Grubb (2006),⁶⁹ Menon et al. (2007),⁷⁰ and Mangan et al. (2010),⁷¹ for example, all suggest that when prospective students make complex, high-stake decisions with long-term implications they struggle to determine which factors are most important, and struggle to gather relevant information. As a result people’s interests and the consequent choices they make are regularly influenced by groups such as peers, teachers, careers guidance officers and parents.⁷²

Greenbank (2011)⁷³ outlines the influence of information presented by influential figures in people’s lives. Based on an action research project, Greenbank highlights the reluctance among students to engage in unfamiliar sources of information in order to influence their

⁶⁸ Byrom, T. (2009). ‘I don’t want to go to a crummy little university’: social class, higher education choice and the paradox of widening participation. *Improving Schools*, 12(3): 209–224.

⁶⁹ Grubb, W.N. (2006). ‘Like, What Do I Do Now?’ the Dilemmas of Guidance Counseling. In: *Defending the Community College Equity Agenda*, edited by T. Bailey and V. Smith Mores, 195–222. Baltimore, MD: Johns Hopkins University Press.

⁷⁰ Menon M., Saiti, A. & Socratous, M. (2007). Rationality, information search and choice in higher education: Evidence from Greece. *Higher Education*, 54 (5): 705–721.

⁷¹ Mangan, J., Hughes, A., Davies, P. & Slack, K. (2010). Fair access, achievement and geography: explaining the association between social class and students’ choice of university. *Studies in Higher Education*, 35(3): 335–350.

⁷² Similar findings are outlined by further research (Oliver & Kettley, 2010; Bogdan et al., 2012, for example) all of which outline the influence on students’ decisions to apply (or not) to HE of specific groups (whether they be peers, teachers, parents or careers guidance officers).

⁷³ Greenbank, P. (2011). ‘I’d rather talk to someone I know than somebody who knows’ – the role of networks in undergraduate career decision-making. *Research in Post-Compulsory Education*, 16(1): 31–45.



decision making processes and argues, therefore, that undergraduates may fail to utilise a wide variety of sources of choice.

Moogan and Baron (2003) suggest that the complexity surrounding HE decision-making and students' interests and choices can be influenced significantly by such influential groups.⁷⁴ For example, prospective male students were more likely to be introduced to HE by their parents compared to female students, while those pupils who made their mind up at an earlier stage to enter HE were less likely to rely on teachers, but more on parents. Kember & Hong (2010) state that in cases where parents or siblings were graduates, it was anticipated that the family members would follow the same path, and even in families where there was no history of HE, people showed a desire to enrol in order to raise the status of the family.⁷⁵

4.2 Conclusion

One of the key points regarding the social aspects of information use in HE is that there is no single solution to the provision of information, and that the 'best' choice for any particular person will differ depending on the life experience and goals of that person. Recognition of this is necessary in order that information providers appreciate the need to serve the great variety of different requirements, aims, preferences and abilities of prospective students and opportunities that exist for them within the HE system.

It is essential to recognise not only the influence of other people, but also the environment in which choices are framed and decisions made. With this understanding in mind, there is a need by HE information providers to engage with people who influence the decisions of prospective students, and to understand how a preference toward decision-making is formed.

⁷⁴ Moogan, Y.J., and Baron, S. (2003). An Analysis of Student Characteristics Within the Student Decision Making Process. *Journal of Further and Higher Education*. 27, no. 3, 271–287.

⁷⁵ Kember, D., Ho, A. & Hong, C. (2010). Initial motivational orientation of students enrolling in undergraduate degrees. *Studies in Higher Education*, 35(3): 263–276.

CHAPTER 5: SOURCES AND PRESENTATION OF INFORMATION

Here we identify sources of information and the various strategies that people employ to seek information effectively.

5.0 Chapter 5 Summary

Prospective HE students use a variety of sources to fulfil their information-seeking requirements, and they employ a variety of methods to reduce the inherent complexity and uncertainty involved in decision-making. Access to a variety of sources of information or simply providing more information does not necessarily lead to more people becoming more informed.

With the increasing pervasiveness of information and communications technology (ICT) and the availability of information, these factors play an important role, including in extending the ways in which prospective students can share and receive information from peers. With the increased marketisation of UK HE, the ways in which information is presented and the methods people employ to access and use information are critical to ensure that prospective students make the right choices for them.

5.1 Sources of Information Used

Within the field of information behaviour, there is surprisingly little research that has compared the effectiveness of various forms of information and how they might affect the decision-making process. It can be difficult for prospective students to know in advance what the experience of studying a particular subject at a particular institution at a certain time will be, and whether the decisions they make as a consequence are right for them. The “post-experience”⁷⁶ nature of HE means that the effects of attending university cannot be known until later after that period of study at university has ended, and only with uncertainty even after the experience.

Studies of student choice, however, outline in detail the forms of information and means of presentation that prospective students perceive as being most important and influential when considering HE. For example, the report ‘Understanding the information needs of

⁷⁶ Economists use the term ‘experience good’ to denote a product that must be used/experienced in order to ascertain its value (such as toothpaste). In relation to this, a ‘post-experience good’ is difficult to value even after the experience of using it. This term has been used to describe UK HE in ‘The Great University Gamble’ (2013) by Andrew McGettigan. The issue is discussed in a book review by Stefan Collini: <http://www.lrb.co.uk/v35/n20/stefan-collini/sold-out>.



users of public information about higher education'⁷⁷ finds that the most frequently used sources of information are:

- university prospectuses and websites (used by 88.4 per cent of students)
- UCAS directories and guides (81.1 per cent)
- family and friends (70.5 per cent)
- university visits (68.3 per cent)
- teachers (65.2 per cent)
- careers advisors (39.2 per cent)

While this study identified the most frequently used sources of information, there are nuances in terms of importance: information from universities themselves (including campus visits and websites/prospectuses) is considered the most influential in the HE decision-making process.

The influence of information provided by universities, however, should not be seen as isolated from other significant influencing factors in the decision-making process. As highlighted in Chapter 4, an individual's choice set is in many instances dictated by the socio-cultural context in which they find themselves, and influenced significantly by influential figures within these contexts, whether they are parents, teachers, peers or careers advisors, for example.

5.1.1 How People Deal with Different Sources of Information

Within HE decision making, prospective students, whatever their background, deal with varying degrees of uncertainty as neither the costs nor the benefits of various options can be known with certainty, and depend on many factors outside the individual's control. Accessing and using different sources of information does not always result in either a decision being made or a reduction of uncertainty, as this information can prompt people to reassess their current level of understanding. People can also be overloaded with information, making further progress toward a goal either cognitively or emotionally impossible.

Information-seeking as a result is a dynamic process, and the nature and requirement of peoples' searching is rarely simple, whether it is for decisions about university attendance which are inherently complex and uncertain, or for something more straightforward (such as the purchase of a holiday or a consumer product). In many instances, satisfying one information need (a preferred geographic location for HE study, for example) can lead to another question or problem (what courses are offered at universities in that area, for

⁷⁷ Oakleigh Consulting and Staffordshire University (2010). Understanding the Information Needs of Users of Public Information About Higher Education. HEFCE.
<https://www.hefce.ac.uk/data/year/2010/understandingtheinformationneedsofusersofpublicinformationabouthighereducationenhancinganddevelopingthenationalstudentsurvey/>.

example) (Case, 2012).⁷⁸ Further to this, as outlined by Christie & Munro (2003) prospective students often lack full information, and/or do not use information that is available to them.⁷⁹ Grubb (2006) has observed that, given their importance, students undertake surprisingly minimal search efforts regarding educational options, often resorting to trial and error. Such ‘satisficing’ behaviour has also been observed by Greenbank (2009).⁸⁰

Research suggests that visiting a particular university plays a particularly valuable role in final, formal decision-making. Exposure to a wider variety of information and information sources, in this instance both formal and informal, and intentional and unintentional, allows prospective students to gather different types of information; observational, qualitative for example. As Allen & Wilson (2003) demonstrate, regardless of the significant information processing and cognitive stages of decision-making, final selection of a university may often come down to whether or not it feels right.⁸¹

Whether or not a decision feels right can also affect whether a piece of information is salient to that individual and their personal outcomes or preferred goals, but where it does not map on to pre-existing interests, or stated goals. In this regard, a person may take no action as a consequence of the information presented to them, as the information passes through them. The report by Diamond, et al. (2013, p.39) suggests that, across HEIs, there is a consensus that prospective students are likely to interpret certain pieces of information (the level of fees charged or entry grades, for example), as a proxy for course quality. In relation specifically to course costs, this finding is supported by research in marketing, which claims that price can exert a non-conscious influence on expectations of product quality and that these expectations may affect product performance.⁸² The salience of such pieces of information, given that students are not homogenous groups, will therefore vary between prospective students: what is most salient to a prospective student whose primary interest is in improving their employability might not be as pertinent to another student motivated by learning itself (Diamond et al. p.49).

Correspondingly, potentially relevant sources of information may not appear particularly salient at the time an information need begins to emerge. In the context of HE and student choice this decision-making process may need to begin many years before any final decision is actually made. Connections between information and the context in which people look to make decisions are, therefore, often missed (Case, 2012).

⁷⁸ Case, D.O. (Ed.), (2012). Op. cit.

⁷⁹ Christie, H. & Munro, M. (2003). The Logic of Loans: students' perceptions of the costs and benefits of the student loan. *British Journal of Sociology of Education*, 24(5), http://www.tandfonline.com/loi/cbse20?open=24-vol_24.

⁸⁰ Greenbank, P. (2009). Foundation degree students and their educational decision-making. *Education + Training*, 51 (4): 259-271.

⁸¹ Allen, D. & Wilson, T.D. (2003). Information overload: Context and Causes. *The New Review of Information Behaviour Research: Studies of Information Seeking in Context (Proceedings of ISIC 2002)*, 4, 31-44.

⁸² Shiv, B., Carmon, Z. and Ariely, D. (2005). ‘Placebo Effects of Marketing Actions: Consumers May Get What They Pay For’, *Journal of Marketing Research*, 42(4): 383-393.



Salience and beliefs “form a part of personal relevance factors, which are antecedent to any information-seeking activity”⁸³, and receiving information does not necessarily change attitudes or behaviour. For these reasons simply increasing the flow of information does not automatically lead to a change in decisions, or range of choices available (Chew & Palmer, 1994;⁸⁴ Reagen, 1996).⁸⁵ As such, filtering behaviour can be both efficient and perfectly rational if it is a matter of conscious activity by that person.

We know from behavioural economics that more information may lead to information overload (as described in Chapter 3). As highlighted above, editing of reality through filtering is not necessarily problematic or irrational, and is often how people naturally treat information, selectively choosing only a small portion of all possible inputs for attention.

This can be a rational response in order to make efficient use of limited cognitive capacity and a virtually unlimited amount of available information. An overloading of information (Savolainen, 2007;⁸⁶ Bawden & Robinson, 2009)⁸⁷ can lead people to reach their cognitive load and adjust their behaviour, by:

- being less precise in categorising relevant information
- incorrectly processing information
- leaving information that may be of relevance to a later date
- omitting certain types of information
- processing only information that is perceived to be important
- splitting up information into more generic categories

Behavioural economics describes how people who are either uninformed or overwhelmed by information are likely to make systematically biased decisions which may be sub-optimal. If behavioural economic thinking is followed therefore, prospective students who are confronted with too much information will unconsciously filter out much of it as part of their own instinctive and natural coping strategies.

Schwartz (2004) has argued that presenting too many options can lead to a ‘paradox of choice’ which, among other things, can cause ‘decision paralysis’. This would seem to be particularly pertinent in light of research by Scott-Clayton (2011) who has shown how a

⁸³ Case, D.O. (2012), Op. cit. p108

⁸⁴ Chew, F., & Palmer, S. (1994). Interest, the knowledge gap, and television programming. *Journal of Broadcasting and Electronic Media*, 38, 271–287.

⁸⁵ Reagen, J. (1996). The ‘repertoire’ of information sources. *Journal of Broadcasting and Electronic Media*, 40: 112–121.

⁸⁶ Savolainen, R. (2007). Filtering and withdrawing: Strategies for coping with information overload in everyday contexts. *Journal of Information Science*, 33(2006)5, 611–621.

⁸⁷ Bawden, D. & Robinson, L. (2009). The dark side of information: Overload, anxiety, and other paradoxes and pathologies. *Journal of Information Science*, 35(2), 180–191.

complex and confusing menu and structure of choices can cause prospective community college students to lose the drive to continue their education.⁸⁸

5.2 The Role of ICT in Information Provision

As well as the influences of particular sources of information, how it is presented and how people engage with that presentation is also a key facet of decision-making, particularly with regards to HE choice. There is a significant body of literature that looks to understand the new role of ICT in influencing how people receive and act upon information.

The internet has redefined how information travels from one place to another, and between people and groups of people; it increasingly permeates our society and drives economic and social change.⁸⁹ People increasingly access information via the internet as part of their daily lives, whether to obtain official information or guidance from government sources, to engage with consumer markets and make consumer purchases, to study and undertake education and research, and to communicate with friends, family and colleagues. How people use the information that they access and its role in informing decisions about HE depends on a variety of factors,⁹⁰ including:

- the information needs and objectives of people;
- the prior experience an individual typically holds in accessing information through ICT use; and
- how subjectively the sources of information provided by ICT are viewed (whether, for example they are viewed as authoritative or not).

5.2.1 User Interactions with Available Information

With personal computing hardware such smart phones and tablets becoming commonplace, and providing an interface for information to become ever more ubiquitous, the potential to increase the type of information that people experience, both intentionally and unintentionally is also great. Consequently, technology advances are increasing the possibility for people to both consume and produce electronic content and information, with the increasing democratisation of how this information is transmitted. Within the last 15 years for example, the internet has been transformed from an ‘internet of computers’, towards a ‘social web’, sometimes referred to as Web 2.0, with the forefront of this change being the development of social networking sites and social media, micro-blogging and the pervasiveness of personal email accounts (Coetzee & Eksteen, 2010).⁹¹ It is clear, therefore,

⁸⁸ Scott-Clayton, J. (2011). The Structure of Student Decision-making at Community Colleges. CCRC Brief. No. 49.

⁸⁹ Cheema, A. & Papatla, P. (2008). Relative importance of online versus offline information for Internet purchases: Product category and Internet experience effects. *Journal of Business Research*, 63(2010): 979–985.

⁹⁰ Punj, G. (2012). Consumer Decision Making on the Web: A Theoretical Analysis and Research Guidelines. *Psychology and Marketing*, 29(10): 791–803.

⁹¹ Coetzee, L. & Eksteen, J. (2011). The Internet of Things – Promise for the Future? An Introduction. In: P. Cunningham & M. Cunningham (eds.), *IST-Africa Conference Proceedings*, IIMC International Information Management Corporation, 2011. <http://ieeexplore.ieee.org/xpl/articleDetails.jsp?tp=&arnumber=6107386>.



that the ease by which people are able to produce, access and consume information has increased exponentially in recent years. However, as already highlighted, simply having access to more information does not necessarily mean people are subsequently more informed.

Decision quality is also affected by the ability and capabilities of the individual, or consumer of information, combined with how the user interacts with the electronic information available. Wider literature on the nature of future education and employment trends suggests that people will need to adapt to ‘move into a variety of different, possibly unrelated fields over the course of their lifetime’ and to do this will need to be self-directed, adaptable and collaborative thinkers, able to build and manage knowledge, link knowledge to existing concepts, and apply that knowledge to different contexts (Collis & Moonen, 2008; Rollett et al., 2007). With specific regard to online information, people with more experience of using ICT are more able to assimilate information and adapt to these new circumstances than those with less experience (Tan et al., 2012). A number of key issues related to information-seeking and decision-making in an ICT context are outlined below.

5.2.1.1 The Visualisation of Information

Research into visual perception suggests that the cognitive load of information-processing is reduced when visual displays are used in place of numerical data. As such, the human visual system has evolved the capacity to recognise patterns and estimate proportions and distances. While visual displays may facilitate efficient information-processing, and may not be as accurate as numerical displays, the visual system is good at picking out meaningful differences and estimating the significance of those differences.

Research on the visual complexity of information displays suggest that displays that are richer in information (and more visually complex) afford more efficient information-processing up to the point of information overload (Harper et al., 2009). This type of information-processing has the potential to be useful for the type of comparative evaluation tasks that are involved in information-behaviour in the context of HE (for example, in comparing an increasingly large number of attributes of a course). As a consequence, the design of online information and the ease with which an individual uses that information or a website, and the presence of appropriate visual cues are important precursors to consider in using information to influence decision-making (Deng and Poole, 2012; Liu et al., 2013).⁹²

Data visualization is further discussed in [Appendix 3](#), which discusses ways of creating information graphics and the benefits to users.

⁹² Deng, L. & Poole, M.S. (2012). Aesthetic design of e-commerce web pages – Webpage Complexity, Order and preference. *Electronic Commerce Research and Applications* 11 (2012) 420–440; Liu, Y., Li, H. and Hu, F. (2013). Website attributes in urging online impulse purchase: An empirical investigation on consumer perceptions. *Decision Support Systems* 55 (2013) 829–837.

5.2.1.2 Time Constraints and Trust

Time constraints and the time available for a consumer to identify and choose a product are also important considerations in how information is presented. While there is no evidence to suggest that when consumers are subject to time pressures they increase the speed of their information processing, time constraints do, however, lead consumers to look at fewer product attributes. This increased selectivity appears to occur mostly at the expense of attributes which are considered moderately important (Weenig and Maarleveld, 2002; Elliot et al., 2012).⁹³

The extent to which an individual trusts information sources presented via ICT and the extent to which this affects their choices is also variable. Evidence from consumer psychology literature suggests that offline information becomes more important for consumers with high levels of experience in using the internet, and that consumer trust of online search engine results actually decreases as people gain more experience of online browsing (Metzger & Flanagin, 2013).⁹⁴ Within an HE context, therefore, it is feasible that those people with more experience of using the internet, or those with greater cultural capital in this area have a greater potential to distrust formal authoritative HE information websites, such as Unistats or online university prospectuses, than those who do not have equivalent experience, access or knowledge of online sources.

5.2.1.3 Product Type

The type of product being purchased can affect how information is used. Research has shown that using information from online sources is more influential in consumer decision making for utilitarian products than for hedonic purchases.⁹⁵ In other words online information is generally considered more important for making practical, non-emotional purchases focused on individual needs, rather than goods consumed for luxury purposes, or for products with delayed gratification (or post-experience goods). HE can be considered an ‘experience good’ or even, according to Brown (2007)⁹⁶ a ‘post-experience good’, with outcomes associated with its purchase not necessarily manifesting themselves until after the individual has already committed to a decision (in many cases, the intended outcomes of studying at university may not manifest themselves at all, or at least for many years after leaving). As the only secure way of obtaining information about a course or institution is to experience it, by that time it may be too late given the difficulties of

⁹³ Weenig, M.W.H. & Maarleveld, M. (2002). The impact of time constraint on information search strategies in complex choice tasks. *Journal of Economic Psychology*, 23: 689–702; Elliot, M.T., Fu, F.Q. & Speck, P.S. (2012). Information Search and Purchase Patterns in a Multichannel Service Industry, *Services Marketing Quarterly*, 33:4, 292-310.

⁹⁴ Metzger, M.J & Flanagin, A.J. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. *Journal of Pragmatics* (2013).

⁹⁵ A utilitarian product refers to an item purchased for everyday use (electricity for example) whereas a hedonic product refers to those things which are purchased for entertainment or fun (a holiday or going out for a meal for example). The decision to attend university can in principle be either, depending on the reasons for that individual attending. For example, if an individual chooses to attend university because of the social life that s/he will experience, then the purchase is more hedonic than if the individual views university as a way of increasing their earning potential.

⁹⁶ Brown, R. (2007). The Information Fallacy. Available at: <http://www.hepi.ac.uk/files/TheInformationFallacy-RogerBrown.pdf>.



switching course or institution. This has important applications within the education system, particularly in the context of the marketisation of HE. While research into online consumer behaviour suggests that people have the potential to make decisions which better meet their needs when purchasing online (for example: Punj, 2012; Liu et al., 2013), whether this choice is considered right for that individual will likely not be known until the attendance at university has happened, or has even been completed.

5.2.2 The Use of ICT in Higher Education Choice

The increasing prevalence of ICT in information searching and HE choice is highlighted by Briggs & Wilson (2007),⁹⁷ who outlines the significance of the internet as a search tool among prospective students. More recent research shows a similar increasing pervasiveness, not only in the use of the ICT, but also through the methods by which information is produced, communicated and consumed (Galifa, 2009; Pampaloni, 2010; Bogdan et al., 2012).⁹⁸

In the report ‘Who and What Influences Choice of University? Student and University Perceptions’, Johnstone (2010)⁹⁹ outlines the emergence of peer-to-peer communication via social media, and the role of influential peers, as changing the way that universities now communicate with prospective students, and the importance people place on this type of information exchange. Johnstone argues that the model of information exchange has moved from a sender-receiver model to one that includes influential peer-to-peer and receiver-to-sender communication.

In this context the use of the ICT does not necessarily mean that formal, authoritative sources of information are most valued through this platform. A combination, for example, of high-touch information seeking strategies (such as university campus visits) and high-tech information seeking strategies (such as the use of social media sites) is most influential for accessing and using information. Johnstone argues that while a campus visit is still vital in ascertaining whether a university offer feels right, the influence of family and peer networks is now transferred far more through ICT. As such, social media, blogging and university websites that also offer an immersive information experience are likely to be valuable for prospective students.

⁹⁷ Briggs, S. & Wilson, A. (2007). Which university? a study of the influence of cost and information factors on Scottish undergraduate choice. *Journal of Higher Education Policy and Management*, 29 (1): 57–72.

⁹⁸ Galifa, J. (2009). An Approach to Find Out Students’ Motives and Influences on Their Selection of Studies and University: Results from six years of continuous institutional research in a multi-campus system in Spain. *Tertiary Education and Management*, 15(2): 173–191; Pampaloni, A.M. (2010). The influence of organizational image on college selection: what students seek in institutions of higher education. *Journal of Marketing for Higher Education*, 20(1): 19–48; Bogdan, S., Bartkowiak, P. & Skuza, A. (2012). Determinants of higher education choices and student satisfaction: the case of Poland, *Higher Education*, 63(5): 565–581.

⁹⁹ Johnstone, T.C. (2010). Who and What Influences Choice of University? Student and University Perceptions. *American Journal of Business Education*, 3(10): 15-24.

According to Constantinides & Stagno (2012)¹⁰⁰ the use of social media has implications for how HE institutions market themselves. People who use social media as an important part of their information seeking, for example, are more focussed on searching for information about universities which outline cultural or social facilities, rather than data on employment figures or other more quantitative/objective information.

5.3 Conclusion

This chapter has highlighted that people use a variety of sources to fulfil their information-seeking requirements, and as such a number of key points can be outlined:

- Information seeking is dynamic, and the nature and requirement of peoples' searching is rarely simple.
- Accessing and using different sources of information does not always result in either a decision being made or a reduction of uncertainty, as this information can prompt people to reassess their current level of understanding of a subject.
- Regardless of the amount or the quality of information available, the final decision (i.e., the selection of a university, a course or specific location) may often come down to whether or not that decision feels right.

Technology offers ways of dealing with large amounts of information, but it can also bring issues of its own to the problem of seeking and evaluating information, for example:

- In situations where there is an overwhelming amount of data, the need for practical and reliable ways of reducing the information-processing task becomes ever more important.
- Time constraints can lead individuals to look toward fewer attributes at the expense of those which might be considered moderately important.
- Social media are more likely to be used for seeking information on cultural/social activities than more quantitative/objective information (i.e., employment outcomes).

HE information providers should be mindful of this complexity with regard to information provision. How information is presented online and the ease with which an individual uses this information plays an important role in a person's ability to engage with information sources. There are also possibly important precursors to consider in using information to influence decision-making.

¹⁰⁰ Constantinides, E. & Stagno, M.Z. (2012). Higher Education Marketing: A Study on the Impact of Social Media on Study Selection and University Choice. *International Journal of Technology and Educational Marketing*, 2(1).



CHAPTER 6: THE COMPLEXITY OF HE DECISION-MAKING

Understanding how people make decisions and the complex personal and emotional factors at play.

6.0 Chapter 6 Summary

When making choices about HE, including where and what to study, people are faced with multiple types of information to process, interpret and use. Existing literature highlights the assumption that if prospective students' access to information improves they will make use of a variety of sources to make 'more informed' decisions about their futures.

The provision of more information is not necessarily better and it is essential to challenge this assumption. Information use is aligned closely to cognitive activity and socially embedded within socio-economic background and context. It is therefore important to understand more about how people will use (and not use) information and the context in which they make decisions.

6.1 How People Make Decisions

Decisions “are typically characterised as choices made from among alternatives; that is, at least two options are available and the decision maker may select only one”.¹⁰¹ As such, the decision maker will gather relevant information to evaluate potential choices against specific alternatives. Research into decision-making usually assumes uncertainty reduction to be important within this context. However, more information does not always reduce uncertainty.¹⁰²

Existing research into student choice outlines that whilst prospective students have not typically been confused or overloaded by large volumes of information available to them, many still find “the choice process complex and difficult” (Connor et al., 1999).¹⁰³ While prospective students may require information that is more focused (containing information on specific courses, institutions and student life for example) it should not be so much that it begins to overwhelm prospective students. Additionally, research outlines that because general daily experiences can be very complex, people naturally use coping

¹⁰¹ Case, D.O., (2012). Op.cit. p97.

¹⁰² Bradac, J.J. (2001). Theory Comparison: Uncertainty reduction, problematic integration, uncertainty management, and other curious constructs. *Journal of Communication*, 51: 456–476.

¹⁰³ Connor, H., Burton, R., Pearson, R., Pollard, E. & Regan, J. (1999). *Making the Right Choice: How students choose universities and colleges*. London: Universities UK. It is important to note here that most of this evidence comes from ex-post surveys which are severely limited as a method for understanding how effectively people process (or do not process) information.

strategies that filter out much of the information presented.¹⁰⁴ As such, it is important to consider how any additional information provided might ultimately be processed and comprehended by prospective students, particularly as new technologies and internet use become ever more pervasive within people lives.

6.1.1 The Implications for Higher Education Choice

Theories of decision-making can be divided into two categories: normative theories are those that describe how people should make decisions, whilst descriptive theories provide accounts of how people actually make decisions. Decision-making in relation to HE constitutes what may be described as a poorly structured problem, because typically it involves too much or too little information, non-specific goals, unclear measures of success, and a shortage of time or attention to devote to the task (Case, 2012).

The traditional economic view of decision-making also assumes that choices rest on the formation of preferences, which are seen as fully formed, rational and largely exogenous. When applied to HE, this assumption requires prospective students to make rational judgements about the quality of programmes and awards at different institutions, and for institutions to respond to those judgements (and actions) by improving quality. Behavioural economics has shown that individual decisions are often the result of preferences that are rarely fully formed, however, and are subject to many different influences. The formation of preferences is intimately connected to the social and institutional context in which people are embedded, and in which these decisions take place.¹⁰⁵

It is a combination of these processes that leads to the development of the choice set that an individual faces. Ultimately then it is from this relatively confined choice set that an eventual choice or decision is made. In forming this choice set information is used to create knowledge in forms that provide meaning and context for action. The process of using information is therefore a dynamic and interactive process of inquiry which involves tacit knowledge. Herbert Simon, in his acceptance speech for the Nobel Prize for economics, outlines the value of a behaviourally informed approach to understanding information-seeking and decision-making:

The main import for economic theory of the research in information processing psychology is to provide rather conclusive empirical evidence that the decision-making process in problem situations conforms closely to the models of bounded rationality described earlier. This finding implies, in turn, that choice is not determined uniquely by the objective

¹⁰⁴ Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R. & Vlaev, I. (2012). Influencing Behaviour: The Mindspace Way. *Journal of Economic Psychology*, 33(1): 264–77.

¹⁰⁵ Hargreaves-Heap, S.P. (2013). What is the meaning of behavioural economics? *Cambridge Journal of Economics*, 37: 985–1000.



characteristics of the problem situation, but depends also on the particular heuristic process that is used to reach the decision.¹⁰⁶

The implication of Simon's statement is that because the nature of HE choice is complex and has subjective aspects, the provision of information about HE should be tailored to individual cases, and we should not assume that 'one size fits all' when it comes to information provision and guidance to support decision-making. Information-searching behaviour relating to HE decision-making is influenced by bounded rationality (Simon, 1955), which is experienced by people whether they make relatively unimportant routine decisions, or more significant life choices concerning, say, their educational career (Meijers, 1995)¹⁰⁷. For example, Menon (2004) finds that 'prospective students carry out fewer information searches than predicted by traditional economic theories (based on ideas of rationality): "The findings thus appear to render more support to the consumer psychology view of an 'unmanageable consumer' rather than to the economic, rational man account of human behaviour." (p. 277). For this reason, Menon claims, there is a need to take into account both economic and non-economic variables in the attempt to explain information behaviour in HE.

For example, Allen (2002),¹⁰⁸ Kintrea et al. (2011)¹⁰⁹ and Dunnett et al. (2012)¹¹⁰ have all found that while coming from a less affluent background does not by itself influence aspirations, place, family and school can tend to push children towards having high or low aspirations. In addition, this research suggests that, regardless of the significant information-processing and cognitive stages of decision-making that may or may not exist, final selection of a university often comes down to whether or not it feels right. This type of emotional basis for decision-making constitutes a form of non-rational behaviour. It demonstrates another way in which the theories of decision-making that are based on assumptions of rationality (such as expected utility theory) fail to account for the way in which people actually make decisions.

6.2 Conclusion

Decision-making that concerns HE (including the choice of whether to enter HE, and what and where to study) functions similarly to decision-making in other contexts, in that it involves less rational consideration than might be first assumed. Non-economic factors –

¹⁰⁶ Simon, H.A. (1978). Rational Decision-Making in Business Organizations. Nobel Memorial Lecture, 8 December, 1978, p. 363. Available at: http://www.nobelprize.org/nobel_prizes/economic-sciences/laureates/1978/simon-lecture.pdf.

¹⁰⁷ Meijers, F. (1995). Arbeidsidentiteit: Studie- En Beroepskeuze in De Post-industriële Samenleving. Alphen aan de Rijn: Samson H.D. Tjeenk Willink.

¹⁰⁸ Allen, D.E. (2002). Toward a Theory of Consumer Choice as Sociohistorically Shaped Practical Experience: The Fits-Like-a-Glove (FLAG) Framework. *Journal of Consumer Research*. 28(4): 515–32.

¹⁰⁹ Kintrea, K., St Clair, R. and Houston, M. (2011). *The Influence of Parents, Places and Poverty on Educational Attitudes and Aspirations*. London: The Joseph Rowntree Foundation.

¹¹⁰ Dunnett, A., Moorhouse, J., Walsh, C. and Barry, C. (2012). Choosing a University: a Conjoint Analysis of the Impact of Higher Fees on Students Applying for University in 2012. *Tertiary Education and Management*. 18, no. 3, 199–220.

that is, factors other than those that can be accounted for in terms of money and time, such as emotional responses – play a significant part in determining the outcome of choices facing prospective students, whether they influence the decision consciously or not. Affective factors are rarely considered in either traditional theories of decision-making or in the sources of information provided to prospective students yet research suggests that these are not only amongst the strongest influencers of decisions but also contribute to the satisfaction that results from that choice.

Evidence from recent research provides a picture of student decision-making that is more nuanced and specific to individual circumstances. As the idea that students are homogeneous has fallen out of favour in theories of decision-making, newer theories acknowledge that university is an emotional decision that is also reliant on previous experience. The implication of these findings is that information provision in HE should be tailored to individual cases and should take account of factors other than those that can be described in financial terms.



CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

Here we outline conclusions emerging from this study, principles to guide the future provision of information, and potential directions for future research.

7.0 Chapter 7 Summary

This chapter summarises the findings of the literature review by presenting a theoretical framework for understanding information behaviour in the context of HE. The chapter also provides a set of principles based on this behavioural understanding which may inform the provision of information in HE. The literature review identified areas where there are gaps in knowledge; therefore this chapter also includes a list of opportunities for further research that have the potential to fill these gaps and contribute further to the understanding of information use and provision in HE.

7.1 Conceptual Framework for Understanding Information Behaviour

The synthesis of the findings from the literature cited in previous chapters has enabled us to devise a framework that summarises a behavioural approach to understanding HE information use and decision-making. This framework (Figure 3) illustrates the way in which people access and process information and how preferences are formed and acted upon. It also shows how this process is subject to behavioural biases via our automatic system, System 1, which can process much of the information and make judgments before System 2 (our cognitive machinery) is even aware. This leads to the development of preferences that influence the choice set. Ultimately, therefore, an individual makes choices from a relatively confined choice set, because “improbable practices are rejected as unthinkable, and only a limited range of practices are possible” (Reay et al., 2005, p. 24).

Importantly, this framework also recognises that the outcome of people’s decisions constitutes a part of the social and institutional context, and that those decisions may therefore change that context. As a result, the social and institutional context is not entirely static. For example, working-class ‘first generation’ applicants to HE can change their own social context and that of their children by, among other things, increasing their earning power and changing expectations. Thus, the information behaviour and preferences of an individual are influenced by their social and institutional context, but their decisions can also influence this context. We may call this interactive relationship reflexivity.

The reflexive nature of information behaviour is represented in the framework diagram by the dashed lines that run from ‘Decision’ back up to ‘Social and institutional context’. By

incorporating the reflexive feedback mechanism that makes information-use a complex psychological and social phenomenon, this conceptual framework captures the essential characteristics of information behaviour relating to the context of HE.

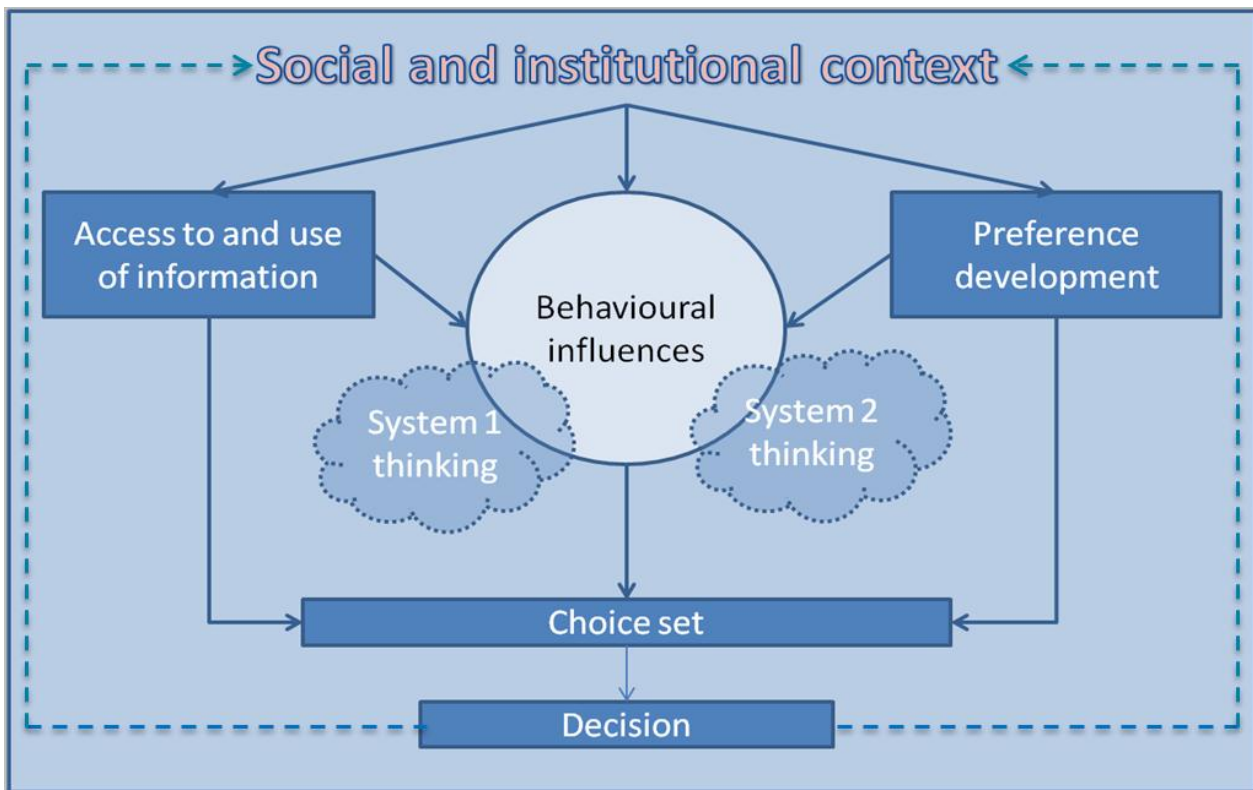


Figure 3: Theoretical framework for conceptualizing information use in higher education

Findings from behavioural studies also suggest that – because of the reflexive nature of HE information use and decision-making – an informed approach to information provision would not only recognize this important point, but would also adopt a reflexive approach to information provision and guidance on HE decision-making. This is the kind of approach put forward by the RSA’s Social Brain Project (which we described at the end of Chapter 3). A reflexive approach to information provision has a more nuanced understanding of information behaviour, and will encourage information users to reflect on their preferences and their environment in order to more fully understand the nature of their decision-making process and the ways in which it is shaped by internal and external influences. A successful behavioural approach will enable information users to better understand their own needs, which will enable them to develop a more informed approach to the complexities of HE decision-making that is consequently more likely to achieve more satisfactory outcomes for all.

7.2 What Does This Mean For Providers of Information About Higher Education?

The UK HE funding councils will wish to consider the implications of the research presented in this Advisory Study in their work on public information on HE. This research

suggests that future efforts to collect and present information about HE should take into account the likely ways in which information will be used and how this impacts on decision-making. In particular, the findings of this research suggest that there are principles that should be followed in order to present information about HE (presented in Table 1, below).

7.2.1 The Limitations of Information-Processing and its Effect upon Decision-Making

Based on the findings of the literature reviewed in this study, there are a number of implications for the provision of information. These implications are borne out of the following knowledge.

- People do not have an unlimited capacity for information processing, therefore can suffer from information overload. (Herbert Simon, 1955; Allen & Wilson, 2003.)
- People rarely have access to complete and accurate information, therefore many decisions are not ‘rational’ or are at least partial. (Herbert Simon, 1997.)
- When there is too little or too much information (i.e. in conditions of uncertainty), people tend to rely on heuristics, which reduce the burden of complex information processing. (Tversky & Kahneman, 1974.)
- Heuristics are a form of non-rational behaviour, and they are prone to bias and error, but they are also non-random and are therefore largely predictable. (Tversky & Kahneman, 1979.)
- Student choice is a form of decision-making under uncertainty, because HE is a “post-experience good” which means that people cannot evaluate its costs or benefits with enough certainty to make rational decisions. (Brown, 2007; Oakleigh Consulting and Staffordshire University, 2010.)
- In place of or in addition to rational decision-making, emotional factors, and non-rational choices often provide the basis for decisions about whether to enter HE and which course or university to attend. This is not necessarily a bad thing; students may feel more satisfied with decisions made on the basis of non-rational and emotional evaluations that cater to their wider needs and preferences. (Greenbank, 2009.)

7.2.2 Social and Psychological Factors Play a Central Role in Information Behaviour and Decision-Making

Evidence presented in our study suggests the following.

- Activity relating to the acquisition and use of information is influenced by a range of factors including personal and psychological traits, as well as social and environmental conditions. (Case, 2012.)
- The influences of the key people and the institutions engaged with are particularly significant in forming information-seeking behaviour and decision-making. (Reay, David & Ball, 2005).

With this understanding in mind, there is a need for HE information providers to engage with people who influence the decisions of prospective students, and to understand how preferences toward decision-making are formed. It is also vital to recognise not only the influence of other people, but also the environment in which choices are framed and decisions are made.

7.2.3 The Role of Higher Education Information Providers Should Be to Support Decision-Making and Empower People to Make Better Choices for Themselves

For providers of information about HE, understanding behavioural principles may offer a route to enabling a more informed and socially reflexive approach to student decision-making. Evidence suggests that such an approach may be supported by understanding how people use information about the conditions of activity they find themselves in, and more specifically how they use this information as a means of reordering or redefining what that activity is.

Existing public policy applications of behavioural economics have looked to ‘nudge’ people toward more positive (or less negative) behaviour. In the context of HE choice however this is largely inappropriate because what might be considered a ‘best’ outcome for one person may be not be optimal for another. Recognising that it is impossible to know whether a ‘best choice’ has been made (due to the impossibility of knowing the outcome of an alternative choice), HE information providers should support prospective students to make more informed decisions and choices that satisfy their own needs, by making people more aware of their own tendencies, preferences and biases.

7.2.4 Decision-Making Can Be a Very Personal Activity and Higher Education Information Providers Should Work toward Tailoring Information Provision to Individual Cases

Our study provides a picture of decision-making that is nuanced and specific to individual circumstances. The idea that prospective students are homogeneous has fallen out of favour in theories of decision-making. Newer theories acknowledge that choosing which university to attend (or even whether to go to university at all) is an emotional decision that is often reliant on the ability of people to draw on previous experience, either their own or others’.

The implication of these findings is that information provision in HE should be tailored to individual cases and should take account of factors other than those that can be described in financial terms. People use a variety of sources to fulfil their information-seeking requirements, and they employ a variety of methods to reduce the complexity and uncertainty involved in decision-making. Information providers will need to understand and serve a variety of different needs, aims, preferences, abilities and opportunities that exist within the HE system. Ultimately, this means that there is no single solution for the provision of the “right” information, as the outcomes of student choice are inherently personal, sometimes coming down to whether a decision simply “feels right”.

7.2.5 Providers of Higher Education Information Should Be Mindful of the Complex and Dynamic Nature of Information Seeking

Evidence from wider literature on information-seeking highlights that it is dynamic, and the nature and requirement of people’s searching is rarely simple, and that accessing and using more and different sources of information does not always result in either a decision



being made or a reduction of uncertainty about that decision. While advancements in technology can offer potential ways of dealing with large amounts of information, it can also introduce complications because of the sheer amount of information to which it affords access. In situations where there is an overwhelming amount of data, the need for practical and reliable ways of reducing the information-processing task becomes ever more important. Research into visual perception suggests that the cognitive load of information-processing can be reduced when visual displays are used in place of numerical data. The design of online information and the ease with which a person uses that information or a website are important precursors to consider in using information to influence decision-making.

HE information providers should be mindful of this complexity with regard to information provision. How information is presented online and the ease with which an individual uses this information plays an important role in a person's ability to engage with information sources; for example, in situations where there is an overwhelming amount of data, the need for practical and reliable ways of reducing the information-processing task becomes ever more important. Therefore, we recommend that a range of specialists should be involved in the design or modification of information sources for HE.

7.3 Principles for Information Provision in Higher Education

We now present a series of principles to underpin ongoing developments in this field. These principles (described in detail in Table 1) are drawn from the literature on behavioural economics, and they take into account the differing psychological, social, environmental and institutional influences that impact on the choices available to people, how they respond to information and the decisions that are ultimately made. While it is for the UK HE funding bodies to consider ways in which HE information is provided, we recommend that these principles be used as the basis from which to develop future strategic discussions in this area.

Principle	
1. Preferences are often partially-formed and endogenous to social and economic context, and people are rarely fully informed utility maximisers.	The preferences of prospective HE students are not fully formed as they seek information and make decisions and are influenced by a wide variety of both personal traits and social and institutional environments. An individual's own curiosity provokes a reflective examination of preferences.
2. A large amount of information processing is done unconsciously by our efficient 'System 1' before our inefficient, cognitive 'System 2' is aware.	Much of the current focus of information provision relies on people overcoming their 'System 1' thinking in order to allow for an optimal consideration of participation in HE. However, decisions influenced by 'System 1' can lead to good outcomes for prospective students; since System 1 is responsible for affective or intuitive responses these might be the best way of someone getting a 'feel' for whether something is right for them.
3. There is heterogeneity across people's decision-making arising both from individual psychological traits and their socio-economic and cultural backgrounds.	Decision-making is process borne out of context. It is embedded in an individual's cultural and socioeconomic background, and the situated nature of their understanding of a piece of information.
4. It should not be assumed that people can effectively process increasing amounts of information; hence more information on a subject does not always lead that individual to be more informed.	The concept of bounded rationality implies that people have a limit to the amount of information they can process. Therefore, effective and informed providers of information are adept at challenging the assumption that 'more information always leads to more informed people'. The right information for the right person will lead to more satisfactory outcomes for that individual.



Principle

<p>5. Irrespective of the volume of information available, people will make their own judgements as to whether they are informed enough to make satisfactory decisions.</p>	<p>Adaptable information provision focuses on understanding what information is salient to which people. Behavioural science shows that people are not always <i>utility maximisers</i>, and many will not exhaust all information sources before making decisions. Further to this, those people who might be considered <i>satisficers</i> are more likely to be satisfied with their decision than maximisers. Evaluating decisions on the basis of satisfaction and in terms of the individual's needs and goals can, therefore, be preferable to evaluations on the basis of simply assessing what information is available.</p>
<p>6. Information itself can lead people to reassess their current level of understanding about a specific subject.</p>	<p>Information seeking is dynamic, and the nature and requirement of peoples' searching, whether it is for decisions about university attendance, which are inherently complex and uncertain, or for more straightforward requirements, can lead to other questions or problems arising. As a result, whether a need is satisfied is not a simple process of understanding.</p>
<p>7. There is no 'one size fits all' solution to information provision.</p>	<p>The psychological traits of an individual, and the social and institutional context in which they find themselves in all impact on how and why information is used. Whether a piece of information is salient to that person is specific to their personal outcomes, preferred goals and life-experiences. As such, there is no one overarching solution to information provision.</p>

Principle	
<p>8. Too much information can lead to cognitive overload or an emotional inability to make satisfactory decisions.</p>	<p>Too much information can lead people to disengage effectively with the information-seeking process. It is challenging to identify the point at which the amount of information becomes too much, made more difficult by the fact that people have different capacities for information-processing and because the difficulty of decision-making will also vary.</p> <p>People may not recognise when their own information-seeking has resulted in too much information to process. Furthermore, being presented with too many choices can lead to ‘decision-making paralysis’ which inhibits the ability to reach a satisfactory outcome. These demotivating conditions occur due to a feeling of helplessness and a lack of control when faced with a task that is too complex and/or too time-consuming to process.</p>

Table 1: Principles for UK HE funding bodies to underpin future information provision for prospective HE students

7.4 Areas for Further Research

Here the report finishes by identifying areas for further research that could benefit the HE sector and key funding partners in their continuing review of the provision of information about HE.

7.4.1 What Are the Patterns of Information Behaviour in HE?

Behavioural and social studies also suggest that variations in information behaviour exist between different people in different places. It would be useful, therefore, for information providers to understand the preferences, needs and habits of their users before designing or modifying information systems. Furthermore, due to bounded rationality, we understand that there are limits to people’s capacity for processing information, and that this can lead to the problem of information overload. Yet we are not yet able to determine when this point of overload is likely to be reached in the context of HE.

A comprehensive study into information behaviour, utilising an experimental approach, could be invaluable in helping to address these gaps in existing knowledge. Therefore, we



suggest that further research is needed, particularly if it were to map information behaviour in specific contexts for specific purposes and help to identify information needs. Such a study would also be beneficial to help identify how much is ‘too much’ information in a given situation, and to recognise when an individual exceeds their capacity for processing information about HE.

A proposal for primary research might, for example, be an experimental online research and the development of an application that encourages students to reflect on why they select particular courses, or particular universities. In order to develop a credible tool to help support decision-making, more quantitative information about the factors affecting student choice under uncertainty and the trade-offs that students make between the various factors affecting their choice would be required. Additionally, student preferences for a specific course may be correlated with a variety of personal characteristics such as risk tolerance level or the social and environmental context in which they live. As such, analysing the extent to which different attributes of choice options as well as specific individual characteristics affect student decision-making would have considerable value to students and institutions alike.

A discrete choice experiment (DCE) would be an appropriate method to gain this insight. A DCE is a technique for eliciting individual preferences by exploring how people value selected attributes of a programme, product or service (in this case a course) by asking them to state their choice over different hypothetical alternatives selected via an experimental design. Specifically the DCE will enable HE information providers to estimate the relative value that potential students attach to various course attributes, as well as the trade-offs that they are willing to make between these different attributes.

7.4.2 Is Data Visualization Effective for Presenting Information about HE?

Our report highlights that there is a wealth of evidence to suggest that visualizing data offers an efficient way of presenting information because it reduces cognitive load (see Appendix 3 for a fuller discussion of this subject). Whilst the potential benefits of this approach are clear in general, there is a lack of evidence about its effectiveness in the specific context of HE information provision. It would be valuable, therefore, to design experiments to test the validity of this approach for information about HE choice to aide decision making.

Such research would complement and build on the knowledge already gained through the user experience research that informed the development and evaluation of KIS and Unistats.¹¹¹ For example, it is interesting to note that users who participated in the research reported concerns about “the sheer quantity of data that they were being asked to parse”,

¹¹¹ This user experience research by iCeGS and CRAC formed Strand A of a wider evaluation. See: <http://www.hefce.ac.uk/pubs/rereports/year/2013/unistatseval/>.

which suggests that they had suffered or came close to suffering information overload.¹¹² Furthermore, users expressed “a strong desire for more guidance on which data were likely to be important” – that is, they recognised that they needed some way of reducing the amount of data that they must process, but struggled to do so.

Following on from these findings, there are potential avenues for future research. One strand could investigate the effectiveness of data visualization by using existing KIS data as the basis for producing a variety of information graphics in different styles. Adopting a similar user-experience approach as that used in the Early Evaluation of Unistats User Experience research could shed light on the effectiveness of data visualization compared with existing numerical presentation formats, and could evaluate which types of graphic are most usable in specific contexts. Another strand of research should examine the KIS information in terms of statistical reliability, seeking ways to present only the most salient information and finding new ways of informing users about the relative strength of the data, so that users could more effectively and confidently select and compare pieces of information. Rather than updating and replacing data each year, it may be preferable to investigate ways of showing long-term trends. Small, information-rich displays such as Edward Tufte’s “sparklines”, for example, could be explored as an efficient means of presenting such information in a way that is easily understood.

Finally, a third strand could explore the needs for contextual information that participants reported in the Evaluation of Unistats User Experience. It is suggested that Unistats assumes that users are interested in the comparison of course information, whereas many educational choices are made by taking into account a wider range of factors (including information about the nature of the course itself, contextual information about the institution within which the course is offered, for example) (Crac & iCeGS, 2012). Recently published research into HE reforms by the Centre for Market and Public Reforms (2014)¹¹³ suggests that if universities can identify which performance measures students focus on when making course choices, they will clearly have strong incentives to target these and improve their performance on these metrics. Further research could investigate ways in which HE information advice and guidance (IAG) could improve and/or adapt in order to meet such demands.

7.4.3 Does a Reflexive Approach to Decision-Making Work for Higher Education?

Whilst the evidence considered in this report suggests that a more behaviourally informed approach to information provision could improve the process of decision-making for prospective students, the review of literature also reveals that there is a lack of evidence to

¹¹² CRAC & iCeGs, (2012). Early Evaluation of Unistats User experiences, http://www.hefce.ac.uk/media/hefce/content/pubs/indirreports/2013/earlyevaluationofunistats/earlyeval_unistats_user.pdf.

¹¹³ Centre for Market and Public Organisation, (2014) Reforms in higher education = higher quality provision and better-informed choice? Available at <http://www.bristol.ac.uk/cmppo/publications/bulletin/winter2014/higher-education-reform.pdf>.



support the feasibility of this approach in the context of HE. We suggest, therefore, that information providers could benefit from the findings of empirical studies in this area. A comparative evaluation of traditional and behaviourally informed approaches would be able to identify the strengths and weaknesses of each, and would provide an evidence base from which information providers could proceed to develop improvements in their services.

7.4.4 What Opportunities Do Future Technologies Offer?

A sustainable information system for the provision of information about HE will take advantage of emerging trends in technology, whilst responding to and taking advantage of patterns of user behaviour. It is also vital that the presentation of information about HE using any online interface reflects the needs, wants and limitations of information users. When presenting information about HE online or developing digital information systems to support the provision of information about higher education, UK HE funding bodies should therefore adopt a user-centred design approach. Such an approach would ensure that information provided responds to the needs of users and adapts to their habits and preferences with regard to information processing, and is not solely informed by research into the information users report they need.

There is also the potential for HE funding bodies to further explore the opportunities presented by future technologies. It is apparent from literature reviewed within this study that there will be advances in technology-mediated social and institutional interactions which will bring greater transparency, increased participation in data creation and manipulation. Further research into this area would nevertheless be valuable to clarify what users of future technology are going to expect and to ensure any future strategy takes account of users' expectations. For example, further insight into this area could help to move the provision of information about HE beyond the static dissemination of information to take account of the potential interactivity of technology to engage prospective HE students.

BIBLIOGRAPHY

- Adriaans, P. (2013). 'Information', *The Stanford Encyclopaedia of Philosophy* (Fall 2013 Edition), Edward N. Zalta (ed.), <http://plato.stanford.edu/archives/fall2013/entries/information/>.
- Allen, D. & Wilson, T. D. (2003). Information overload: Context and Causes. *The New Review of Information Behaviour Research: Studies of Information Seeking in Context* (Proceedings of ISIC 2002), 4, 31–44.
- Allen, D. E. (2002). Toward a Theory of Consumer Choice as Sociohistorically Shaped Practical Experience: The Fits-Like-a-Glove (FLAG) Framework. *Journal of Consumer Research*, 28(4): 515–32.
- Archer, L., Hollingworth, S. & Halsall, A. (2007) 'University's not for Me — I'm a Nike Person': Urban, Working-Class Young People's Negotiations of 'Style', Identity and Educational Engagement. *Sociology*, 41(2): 219–237.
- Bateson, G. (1972). *Steps to an Ecology of Mind*. New York: Ballantine.
- Bates, Pollard, Usher & Oakley, (2009). *Who is Heading for HE? Young People's Perceptions of, and Decisions About, Higher Education*. Research paper 3, Department for Business, Innovation and Skills. Available at: http://www.employment-studies.co.uk/pdflibrary/bis_rp_003.pdf.
- Bawden, D. & Robinson, L. (2009). The dark side of information: Overload, anxiety, and other paradoxes and pathologies. *Journal of Information Science*, 35(2), 180–191.
- Bogdan, S., Bartkowiak, P. & Skuza, A. (2012) Determinants of higher education choices and student satisfaction: the case of Poland. *Higher Education*, 63(5): 565–581.
- Bourdieu, P. (1967). Systems of education and systems of thought. *Social Science Information*, 14: 338–358.
- Bourdieu, P. (1977). Cultural Reproduction and Social Reproduction. In: J. Karabel & A. H. Halsey (eds.), *Power and Ideology in Education*. New York: Oxford University Press.
- Bourdieu, P. (1984). *Distinction*. London: Routledge and Kegan Paul.
- Bourdieu, P. (1986). The Forms of Capital. In: Richardson, J. G. (ed.) *Handbook of Theory and Research for the Sociology of Education*. Greenwood Press, New York, pp. 241–258.



- Bradac, J. J. (2001). Theory Comparison: Uncertainty reduction, problematic integration, uncertainty management, and other curious constructs. *Journal of Communication*, 51, 456–476.
- Briggs, S. & Wilson, A. (2007). Which university? a study of the influence of cost and information factors on Scottish undergraduate choice. *Journal of Higher Education Policy and Management*, 29 (1): 57–72.
- Brown, R. (2007). *The Information Fallacy*. Available at: <http://www.hepi.ac.uk/files/TheInformationFallacy-RogerBrown.pdf>.
- Bruce, V., Green, P.R. and Georgeson, M. A. (2003). *Visual Perception: Physiology, Psychology and Ecology*. Fourth edition. New York: Psychology Press.
- Byrom, T. (2009). ‘I don’t want to go to a crummy little university’: social class, higher education choice and the paradox of widening participation. *Improving Schools*, 12(3): 209–224.
- Centre for Market and Public Organisation, (2014) *Reforms in higher education = higher quality provision and better-informed choice?* Available at <http://www.bristol.ac.uk/cmpo/publications/bulletin/winter2014/higher-education-reform.pdf>.
- Callender, C. & Jackson, J. (2008). Does the Fear of Debt Constrain Choice of University and Subject of Study? *Studies in Higher Education*. 33(4): 405–429.
- Camerer, C.F. & Loewenstein, G. (2002). *Behavioural Economics: Past, Present, Future*, Available at <http://www.hss.caltech.edu/~camerer/ribe239.pdf>.
- Case, D. O. (Ed.) (2012). *Looking for Information: A Survey of Research on Information Seeking, Needs, and Behaviour*. 3rd edition. Bingley: Emerald.
- Cheema, A. & Papatla, P. (2008). Relative importance of online versus offline information for Internet purchases: Product category and Internet experience effects. *Journal of Business Research*, 63(2010): 979–985.
- Chew, F. & Palmer, S. (1994). Interest, the knowledge gap, and television programming. *Journal of Broadcasting and Electronic Media*, 38, 271–287.
- Christie, H. & Munro, M. (2003). The Logic of Loans: students' perceptions of the costs and benefits of the student loan. *British Journal of Sociology of Education*, 24(5).

- Connor, H., Burton, R., Pearson, R., Pollard, E. & Regan, J. (1999). *Making the Right Choice: How students choose universities and colleges*. London: Universities UK.
- Constantinides, E. & Stagno, M. Z. (2012). Higher Education Marketing: A Study on the Impact of Social Media on Study Selection and University Choice. *International Journal of Technology and Educational Marketing*, 2(1).
- CRAC & iCeGs (2012). *Early Evaluation of Unistats: User experiences*. HEFCE. Available at: http://www.hefce.ac.uk/media/hefce/content/pubs/indirreports/2013/earlyevaluationofunistats/earlyeval_unistats_user.pdf.
- Deng, L. & Poole, M. S. (2012). Aesthetic design of e-commerce web pages – Webpage Complexity, Order and preference. *Electronic Commerce Research and Applications*, 11 (2012) 420–440
- Diamond *et al.* (2012). *Behavioural Approaches to Understanding Student Choice*. HEA/NUS, http://www.heacademy.ac.uk/resources/detail/evidence_informed_practice/Student_Choice.
- Dolan, P., Hallsworth, M., Halpern, D., King, D. & Vlaev, I. (2010). *MINDSPACE: Influencing behaviour through public policy*. London: Cabinet Office; Institute for Government. Available at: <http://www.instituteforgovernment.org.uk/publications/mindspace>.
- Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R. & Vlaev, I. (2012). Influencing Behaviour: The Mindspace Way. *Journal of Economic Psychology*, 33(1): 264–77.
- Donderi, D.C. and McFadden, S. (2004). A single marine overlay is more efficient than separate chart and radar displays. *Displays*, 24 (4–5): 147–155.
- Dunne, M., King, R. & Ahrens, J. (2013). Applying to higher education: comparisons of independent and state schools. *Studies in Higher Education*, (pre-publication), <http://dx.doi.org/10.1080/03075079.2013.801433>.
- Dunnett, A., Moorhouse, J., Walsh, C. & Barry, C (2012). Choosing a University: A conjoint analysis of the impact of higher fees on students applying for university in 2012. *Tertiary Education and Management*, 18(3): 199–220.
- Elliot, M. T., Fu, F. Q. & Speck, P.S. (2012). Information Search and Purchase Patterns in a Multichannel Service Industry. *Services Marketing Quarterly*, 33:4, 292-310.
- Finnie, R. (2012). Access to post-secondary education: The importance of culture. *Children and Youth Services Review*, 34(6): 1161–1170.



- Gallifa, J. (2009). An Approach to Find Out Students' Motives and Influences on Their Selection of Studies and University: Results from six years of continuous institutional research in a multi-campus system in Spain. *Tertiary Education and Management*, 15(2): 173–191.
- Garner, W.R. (1962). *Uncertainty and structure as psychological concepts*. New York, NY: Wiley.
- Giddens, A. (1994). *Beyond Left and Right – the future of radical politics*. Cambridge: Polity Press.
In: Rowson, J. (2011). *Transforming Behaviour Change: Beyond Nudge and Neuromania*, RSA.
- Greenbank, P. (2009). Foundation degree students and their educational decision-making. *Education + Training*, 51 (4): 259-271.
- Greenbank, P. (2011). 'I'd rather talk to someone I know than somebody who knows' – the role of networks in undergraduate career decision-making. *Research in Post-Compulsory Education*, 16(1): 31–45.
- Grist, M. (2009). *Changing the Subject: How new ways of thinking about human behaviour might change politics, policy and practice*. RSA. Available at: <http://www.thersa.org/action-research-centre/learning,-cognition-and-creativity/social-brain/reports/changing-the-subject>.
- Grubb, W. N. (2006). 'Like, What Do I Do Now?' the Dilemmas of Guidance Counseling. In: *Defending the Community College Equity Agenda*, T. Bailey and V. Smith Morest (Eds.), 195–222. Baltimore, MD: Johns Hopkins University Press.
- Hargreaves Heap, S. P. (2013). What is the meaning of behavioural economics? *Cambridge Journal of Economics*, 37: 985–1000.
- Harrison, N. & Hatt, S. (2011) . Expensive and failing? the role of student bursaries in widening participation and fair access in England. *Studies in Higher Education*, 37(6): 695–712.
- Harter, S. P. (1992). Psychological relevance and information science. *Journal of the American Society for Information Science*, 43: 602–615.
- Ignition Consulting Group (2013). *What you should know about behavioural economics*. Available at: <http://www.ignitiongroup.com/cognition/guides/What-you-should-know-about-behavioral-economics/>.
- InterLink (2013). *Future Trends in Information Technology*, North Central Texas Interlink, Inc. Available at: http://www.interlink-ntx.org/interlink_trends_report.pdf.

- Jabbar, H. (2011). The Behavioural Economics of Education: New Directions for Research. *Educational Researcher*, 40(9): 446–453.
- John, P., Smith, G. & Stoker, G. (2009). Nudge Nudge, Think Think: Two Strategies for Changing Civic Behaviour. *The Political Quarterly*, 80: 361–370. Available at: <http://www.esrc.ac.uk/my-esrc/grants/RES-177-25-0002/outputs/read/2927dff6-060b-4a9e-8b36-be26df6a7fd5>.
- Johnson, E.J. & Goldstein, D. (2003). Do Defaults save Lives? Available at: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.173.2319&rep=rep1&type=pdf>.
- Johnstone, T. C. (2010). Who and What Influences Choice of University? Student and University Perceptions. *American Journal of Business Education*, 3(10): 15–24.
- Kahneman, D. & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, 47(4): 263–292.
- Kahneman, D. (2011). *Thinking, Fast and Slow*. London: Penguin.
- Katopol, P. F. (2005). Library anxiety. In: K. E. Fisher, S. Erdelez & E. F. McKechnie (Eds.), *Theories of information behaviour* (pp. 235-238). Medford, NJ: Information Today.
- Kember, D., Ho, A. & Hong, C. (2010). Initial motivational orientation of students enrolling in undergraduate degrees. *Studies in Higher Education*, 35(3): 263–276.
- Kettley, N. C. & Whitehead, J. M. (2011). Remapping the “landscape of choice”: patterns of social class convergence in the psycho-social factors shaping the higher education choice process. *Educational Review*, 64(4): 493–510.
- Kintrea, K., St Clair, R. & Houston, M. (2011). *The Influence of Parents, Places and Poverty on Educational Attitudes and Aspirations*. London: The Joseph Rowntree Foundation.
- Liu, Y., Li, H. & Hu, F. (2013). Website attributes in urging online impulse purchase: An empirical investigation on consumer perceptions. *Decision Support Systems* 55 (2013) 829–837.
- Mangan, J., Hughes, A., Davies, P. & Slack, K. (2010). Fair access, achievement and geography: explaining the association between social class and students’ choice of university. *Studies in Higher Education*, 35(3): 335–350.
- McCandless, D. (2010). *The beauty of data visualization*. Available at: http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization.html.



- McCandless, D. (2012). *Information is Beautiful*. London: Collins.
- McGettigan, A. (2013). *The Great University Gamble: Money, Markets and the Future of Higher Education*. Pluto Press.
- Meijers, F. (1995). *Arbeidsidentiteit: Studie- En Beroepskeuze in De Post-industriële Samenleving*. Alphen aan de Rijn: Samson H.D. Tjeenk Willink.
- Menon, M., Saiti, A. & Socratous, M. (2007). Rationality, information search and choice in higher education: Evidence from Greece. *Higher Education*, 54 (5): 705–721.
- Menon, M. E. (2004). Information search as an indication of rationality in student choice of higher education. *Education Economics*, 12(3): 267–283.
- Metzger, M. J., & Flanagin, A.J. (2013). Credibility and trust of information in online environments: The use of cognitive heuristics. *Journal of Pragmatics* (2013).
- Moles, A. (1966). *Information Theory and Esthetic Perception*. London: University of Illinois Press.
- Moogan, Y. J. & Baron, S. (2003). An analysis of student characteristics within the student decision-making process. *Journal of Further and Higher Education*, 27(3): 271–287.
- Norman, D. A. (1998). *The Design of Everyday Things*. London: MIT Press.
- Norman, D. A. (2006). Why doing user observations first is wrong. *Interactions*, 13(4): 50–ff. Available at: http://www.jnd.org/dn.mss/why_doing_user_obser.html.
- Oakleigh Consulting and Staffordshire University (2010). *Understanding the information needs of users of public information about higher education*. HEFCE.
- Oppenheimer, D. M. (2006). Consequences of Erudite Vernacular Utilized Irrespective of Necessity: Problems with Using Long Words Needlessly. *Applied Cognitive Psychology*, 20(2): 139–156.
- Pampaloni, A. M. (2010). The influence of organizational image on college selection: what students seek in institutions of higher education. *Journal of Marketing for Higher Education*, 20(1): 19–48.
- Prabha, C., Connaway, L. S., Olszewski, L. & Jenkins, L. R. (2007). What is enough? Satisficing information needs. *Journal of Documentation*, 63(1): 74–89.

- Punj, G. (2012). Consumer Decision Making on the Web: A Theoretical Analysis and Research Guidelines. *Psychology and Marketing*, 29(10): 791–803.
- Reagen, J. (1996). The ‘repertoire’ of information sources. *Journal of Broadcasting and Electronic Media*, 40: 112–121.
- Reay, D., David, M.E. & Ball, S. (2005). *Degrees of Choice: Social class, race and gender in higher education*. London: Institute of Education Press.
- Reay, D., Crozier, G. & Clayton, J. (2010). ‘Fitting in’ or ‘standing out’: working-class students in UK higher education. *British Educational Research Journal*, 36(1): 107–124.
- Rowson, J. (2010). Changing Behaviour Change. Left Foot Forward, 15 June. Available at: <http://www.leftfootforward.org/2010/06/changing-behaviour-change/>.
- Rowson, J. (2011). Transforming Behaviour Change: Beyond Nudge and Neuromania. RSA. Available at: <http://www.thersa.org/action-research-centre/learning,-cognition-and-creativity/social-brain/reports/transforming-behaviour-change>.
- Savolainen, R. (2007). Filtering and withdrawing: Strategies for coping with information overload in everyday contexts. *Journal of Information Science*, 33(5): 611–621.
- Schwartz, B. (2004). *The paradox of choice: Why less is more*. Harper Collins.
- Scott-Clayton, J. (2011). The Structure of Student Decision-making at Community Colleges. *CCRC Brief*, No. 49.
- Shannon, C. E. (1948). A Mathematical Theory of Communication. *Bell System Technical Journal*, 27: 379–423; 623–656.
- Shiv, B., Carmon, Z. & Ariely, D. (2005). ‘Placebo Effects of Marketing Actions: Consumers May Get What They Pay For’. *Journal of Marketing Research*, 42(4): 383–393.
- Simon, H. A. (1955). A Behavioural Model of Rational Choice. *The Quarterly Journal of Economics*, 69(1): 99–118.
- Simon, H. A. (1997). *Models of Bounded Rationality. Volume 3: Empirically Grounded Economic Reason*. Cambridge, Massachusetts: MIT Press.
- Speier, C., Vessey, I. & Valacich, J.S. (2003). The Effects of Interruptions, Task Complexity, and Information Presentation on Computer-Supported Decision-Making Performance. *Decision Sciences*, 34(4): 771–797.



- Suber, P. (2012). *Open Access*. MIT Press. Available at:
http://cyber.law.harvard.edu/hoap/Open_Access_%28the_book%29.
- Thaler, R. & Sunstein, C. (2008). *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Yale University Press.
- Thaler, R. H., Sunstein, C. R. & Balz, J. P. (2010). *Choice Architecture*. Available at:
http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1583509.
- Toffler, A. (1970). *Future Shock*. Random House.
- Tufte, E.R. (2001). *The Visual Display of Quantitative Information*. Cheshire, Connecticut: Graphics Press.
- Tufte, E. (2013). Sparkline theory and practice. http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=0001OR.
- Tversky, A. & Kahneman, D. (1974). Judgement under Uncertainty: Heuristics and Biases. *Science, New Series*, 185(4157): 1124–1131. Available at:
http://psiexp.ss.uci.edu/research/teaching/Tversky_Kahneman_1974.pdf.
- Weenig, M. W. H. & Maarleveld, M. (2002). The impact of time constraint on information search strategies in complex choice tasks. *Journal of Economic Psychology*, 23: 689–702.
- Wilson, T. D. (1997). Information Behaviour: An Interdisciplinary Perspective. *Information Processing & Management*, 33(4): 551–572. Available at:
http://scholar.google.co.uk/scholar_url?hl=en&q=http://www.academia.edu/download/31012976/infoBehavior.pdf&sa=X&scisig=AAGBfm368DwcqKrc75pBw1bdEohCvW8JTg&oi=scholar&ei=8uomU8XZKIUrhQfvx4HgBA&ved=0CCwQgAMoADAA
- Wurman, R. S. (1989). *Information Anxiety*. New York, NY: Doubleday.

APPENDIX 1: LITERATURE SEARCH TERMS

Table 2 lists the key terms used for the literature search.

Primary Search Terms	Key words / associated terms
Information	
Theory of Information	Affect heuristics
	Agenda-setting theory
	Anchors and anchoring effects
	Attribute substitution
	Availability heuristics and availability bias
	Primacy effect
	Processing fluency
	Representative heuristics
Forms of information	Saliency
	Information from friends and peers
	Key Information Set
	Other publicly available information (e.g. Newspaper Features and League Tables)
	Parental guidance
	Teachers and careers advisors
	UCAS directories and guides
Identifying information	University related publicity (e.g. prospectuses and websites, admissions, open days)
	Information asymmetry
	Information overload
	Information searching
	Knowledge gap
	Paradox of choice
Use of information	Social Network Analysis
	Affective influences
Presentation of information	Students as information users
	Modes of delivery
	Messenger effects
	Simplification and the use of heuristics
	Information asymmetry
Information and advice and guidance	Framing effects
	Priming
	Careers advice and guidance and careers counselling
	Unfamiliar and authoritative influences
	Planned happenstance
Behaviour	Segmentation of career decision-making
	Use of websites
Use of websites	Accessibility
	Search terms and building awareness



	Usability
Decision-making processes	Attribution biases (for example: projection bias; system justification; trait ascription bias)
	Careers advice support systems
	Course selection higher education
	Decision-making biases (for example: Anchoring; confirmation bias; distinction bias)
	Differentiation between school, college, undergraduate and postgraduate decision-making
	Exemplar networks
	Key influences (e.g. academic reputation, location, distance from home, fees, mode of study)
	Marketisation (e.g. unrestricted choice, amenities of university and programme flexibility).
	Mature student decision-making
	Networks of intimacy
	Norms and non-participation
	Parental influence
	Rationality
	Student aims
	Systematic errors
Behavioural factors in decision-making	Adaptive bias
	Affect forecasting
	Bounded rationality
	Cognitive dissonance
	Cognitive influences
	Heuristics
	Loss aversion and the investment dimension
	Mental accounting
	Pre-existing frames / norms
	Prospect theory
	Risk aversion – students
	Rules of thumb
	Time preference - students
	Timing and choice - student decisions
Technology	
Societal or cultural transformations	Multi-mode communication channels
Technology tools and the application of new technology	Access layers and social layers of data
	Apps and Smartphone technology
	Cloud software / storage
	Course-Related Information (XCRI) protocols
	E-government agenda and data driven public services
	Functional data tools (e.g. LMI for all)
	Gaming
	Hardware / software
Independent information sources (e.g. Which? University)	

	Innovation
	Interactivism (e.g. hack days and socially generated information)
	Market failures and the market for the provision of information – alternative providers (inc. Social entrepreneurs; Futuregov; Hotcourses; and The School of Everything)
	Open data tools
	Social media (inc. Student room, Facebook, Twitter, etc.)
	Subscription activity
	User-generated content
	Web 2.0; Web 3.0; Google; interactivity

Table 2: Key search terms for literature review phase of the Advisory Study

APPENDIX 2: LITERATURE ANALYSIS

Each report is classified according to the following details, which are then incorporated into a framework for analysis:

- Bibliographic reference details
- Author
- Year of publication¹¹⁴
- Title
- Abstract
- Categorisation by key search terms (outlining in which categories of interest the research document relates to)
- Theme (a short heading on the broad topic of investigation within each document)
- Methodology (an outline of the key methodological points)
- Critical evaluation of the methodology (an assessment of the quality of the method)
- Methodology score (out of three, one being the best)
- Key findings and outcomes of the research (an analysis of the key research findings, any useful outcomes and any potential learning that is useful for our project)
- Relevance to the research project (whether the topic and findings of the document are relevant to our aims, A being most relevant and C being least relevant)
- Use of document in the literature review (whether the document should be incorporated into our final report – a yes or no).

The charts below (Figures 4 to 6) represent the main results of the literature analysis, based on the categorisation process described in Chapter 1.

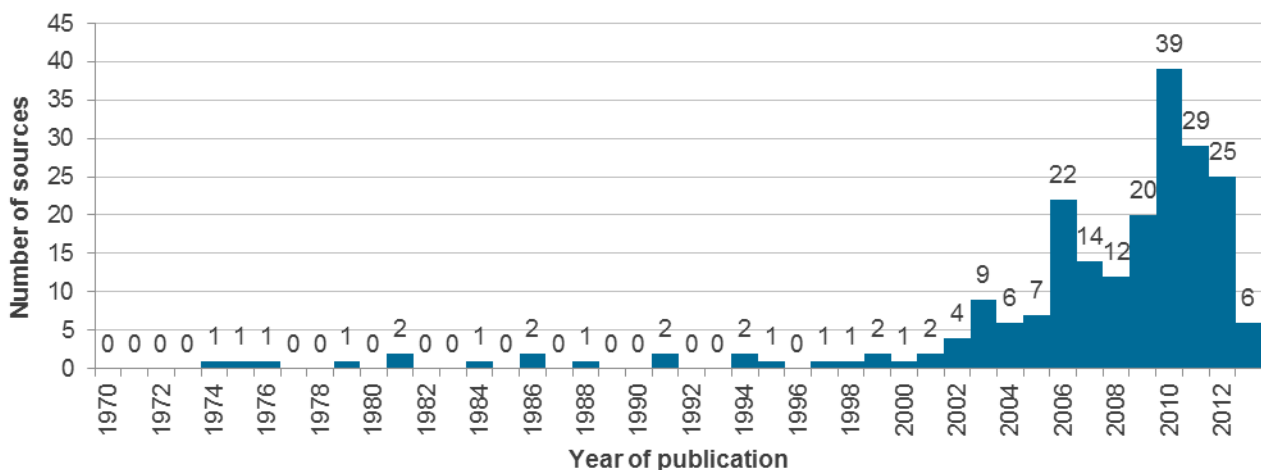


Figure 4: Date of source material (year of publication)

¹¹⁴ Our initial intention was to use 2006 as the cut-off year, but on review of the literature (specifically on information behaviour) a number of reports are included that precede this date. This is because of their importance to the subject of this study.

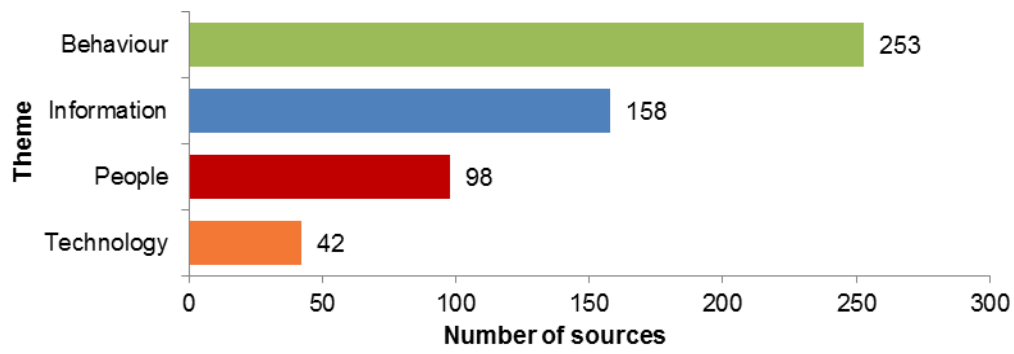


Figure 5: Distribution of source material by broad themes (number of sources per theme)

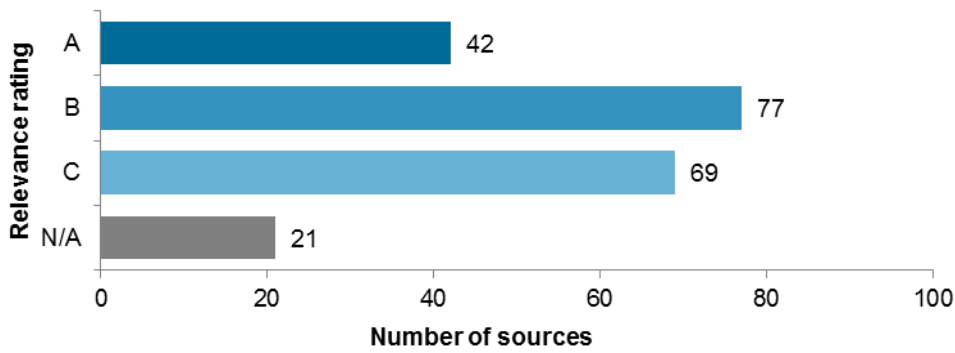


Figure 6: Relevance rating of literature sources (number of sources per rating)

APPENDIX 3: DATA VISUALISATION AS A SOLUTION TO INFORMATION OVERLOAD

The problem of information overload is becoming increasingly significant as the amount of available information increases through the Internet and other information systems. This issue can be illustrated with an online search for information: A Google search for “information overload” returns 1.65 million results in around 0.2 seconds.¹¹⁵ It is physically impossible to read all of those results. In these situations, therefore, there is an increasing need for refined search criteria that are able to reduce the number of choices in order to reduce the cognitive load and improve the decision-making task.

Another proven strategy for reducing information overload is to visualize data instead of presenting it numerically. The human visual system has evolved the capacity to process a large amount of information in a very short time, such that it has the capacity to identify shapes and estimate size and distance quite quickly and accurately.¹¹⁶ For example, it is an evolutionary advantage to be able to judge distances accurately, because that could make the difference between life and death (e.g. avoiding being caught by a predator). This means that we are able to quickly identify shapes and patterns and to accurately estimate sizes and distances. Thus, visual perception has become increasingly refined to process as much relevant information as possible and to ignore unnecessary information.

1		2		3		4	
x	y	x	y	x	y	x	y
10.0	8.04	10.0	9.14	10.0	7.46	8.0	6.58
8.0	6.95	8.0	8.14	8.0	6.77	8.0	5.76
13.0	7.58	13.0	8.74	13.0	12.74	8.0	7.71
9.0	8.81	9.0	8.77	9.0	7.11	8.0	8.84
11.0	8.33	11.0	9.26	11.0	7.81	8.0	8.47
14.0	9.96	14.0	8.10	14.0	8.84	8.0	7.04
6.0	7.24	6.0	6.13	6.0	6.08	8.0	5.25
4.0	4.26	4.0	3.10	4.0	5.39	19.0	12.50
12.0	10.84	12.0	9.13	12.0	8.15	8.0	5.56
7.0	4.82	7.0	7.26	7.0	6.42	8.0	7.91
5.0	5.68	5.0	4.74	5.0	5.73	8.0	6.89

Table 3: Anscombe’s quartet: Four sets of quantitative data, each with ten x and ten y values

The advantages of visualizing quantitative information can be illustrated with what is known as “Anscombe’s quartet”. To demonstrate the effectiveness of data visualization, the

¹¹⁵ <https://www.google.co.uk/search?q=%22information+overload%22>

¹¹⁶ Bruce, V., Green, P.R. and Georgeson, M. A. (2003). Visual Perception: Physiology, Psychology and Ecology. Fourth edition. New York: Psychology Press.

statistician Francis Anscombe (1918–2001) created four sets of data (Table 3, above) that are identical in terms of statistical properties: Each data set has the same mean ($x = 9.0$, $y = 7.5$), variance ($x = 11.0$, $y = 4.1$), correlation (0.82) and linear regression ($y = 3.0 + 0.5x$). Looking at the numbers in the tables, it is difficult to perceive any meaningful patterns in the data. But visualizing the same data as scatter plots reveals widely different distributions, clearly showing useful information such as trends and outliers (Figure 7, below). The fact that our visual system is able to instantly identify these patterns in the visualized data supports the idea that this method offers a means of presenting information that is much less demanding in terms of cognitive load.

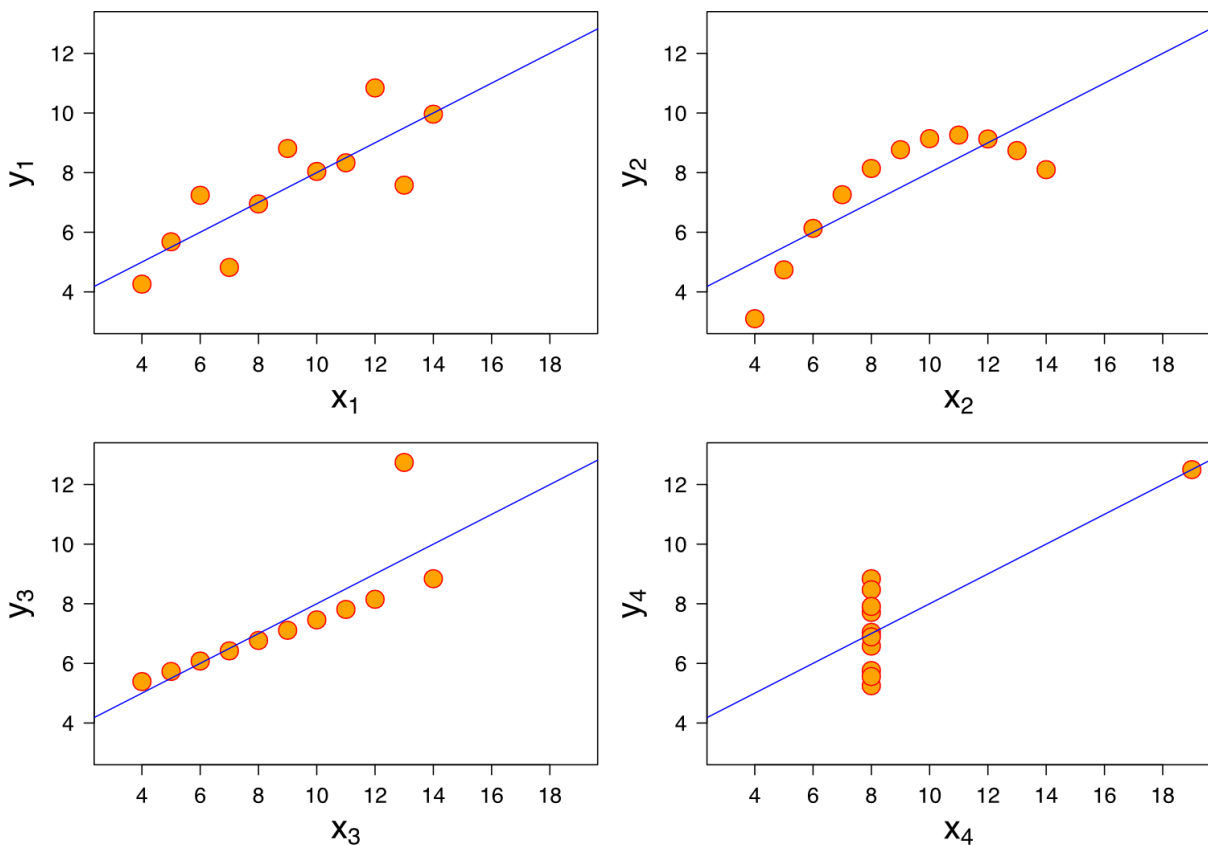


Figure 7: Anscombe’s quartet: Four sets of data visualized as scatter plots (blue lines represent linear regression). [Image by Schutz, licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported license](https://creativecommons.org/licenses/by-sa/3.0/)]

Because visual information processing occurs almost instantaneously and without conscious effort, it is characteristic of what Kahneman (2012) calls “System 1” thinking. In contrast with visual processing of graphical information, processing numerical information is a more demanding task, and is characteristic of System 2. Therefore, visualizing information offers a way to reduce cognitive load and mitigate the problem of information overload. This position is argued by David McCandless, author of the book *Information is Beautiful* (2010),¹¹⁷ in a TED talk that argues for data visualisation as a tool for dealing with big data:

¹¹⁷ <http://www.davidmccandless.com/books/>



It feels like we're all suffering from information overload or data glut. And the good news is there might be an easy solution to that, and that's using our eyes more. So, visualizing information, so that we can see the patterns and connections that matter and then designing that information so it makes more sense, or it tells a story, or allows us to focus only on the information that's important.¹¹⁸

Similarly, the graphic design principles of Edward Tufte also demonstrate that visual display offers an efficient way of dealing with quantitative information.¹¹⁹ What Tufte describes as “Probably the best statistical graphic ever drawn”¹²⁰ is Charles Minard’s map of Napoleon’s army in the Russian campaign of 1812, which manages to represent many different dimensions of data (size of the army, geographical position and elevation, direction of travel, time, and temperature) in a two-dimensional display on paper (Figure 8). This graphic demonstrates that by taking advantage of our powers of visual perception it is possible to represent large amounts of complex data in a meaningful and accessible way.

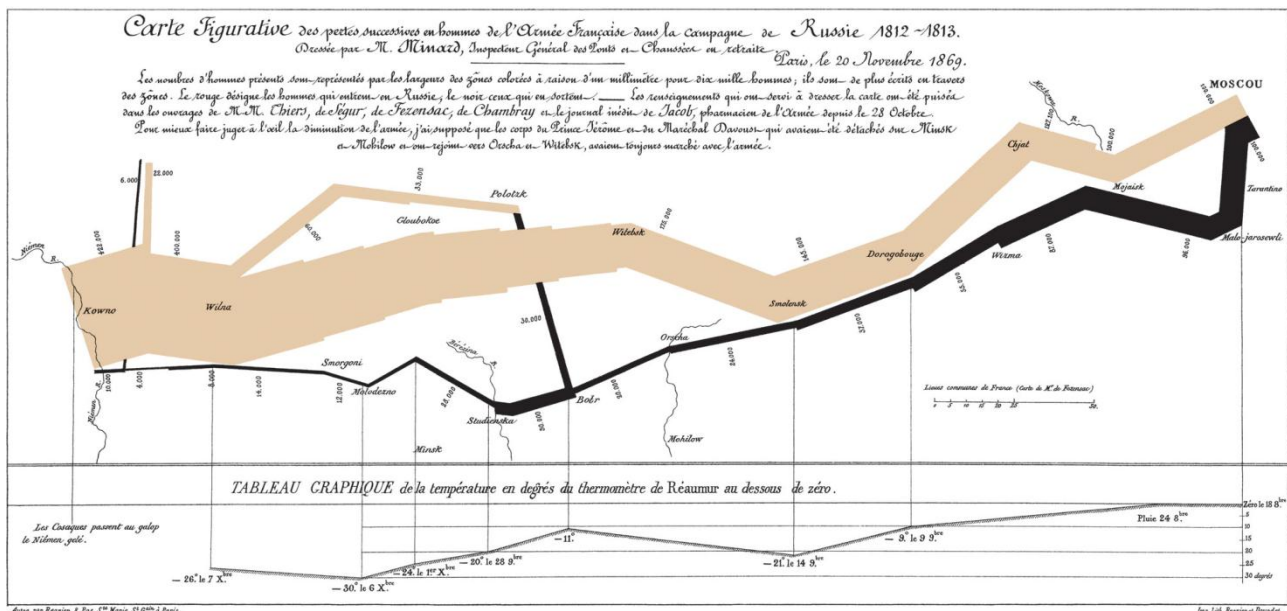


Figure 8: Charles Joseph Minard (1869). Figurative map of the successive losses in men of the French Army in the Russian campaign 1812–1813. [Image in the public domain]

The same point about the benefits of data visualization has been argued by statistics expert Professor Hans Rosling, who creates accessible and engaging visual displays based on large and complex data sets.¹²¹ Contrary to intuition, information-rich visual displays can offer an efficient way of presenting information. Donderi & McFadden’s (2004) study carried out for the Canadian Ministry of Defence investigated the optimal information density for

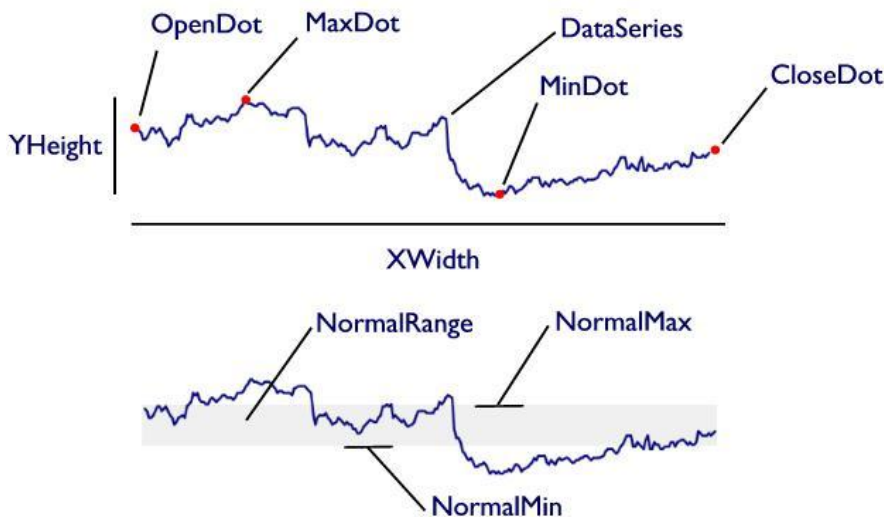
¹¹⁸ McCandless, D. (2010). *The beauty of data visualization*. Available at: http://www.ted.com/talks/david_mccandless_the_beauty_of_data_visualization.html.

¹¹⁹ Tufte, E.R. (2001). *The Visual Display of Quantitative Information*. Cheshire, Connecticut: Graphics Press.

¹²⁰ <http://www.edwardtufte.com/tufte/posters>

¹²¹ For example, see Prof. Rosling’s engaging four-minute presentation of 200 years’ data on wealth and health for 200 countries: <http://youtu.be/jbkSRLYSojo>.

visual displays, finding that a single more complex image led to quicker and more accurate responses than two separate displays.¹²² Tufte has developed a method of presenting time-series data for this purpose, representing data in a very concise format that could fit into lines of text: “Sparklines”, as they are called, are “intense, simple, word-sized graphics”¹²³ that clearly show trends, averages and min/max points (Figure 9).




This is an example of the above sparkline with a normal range embedded in text. This shows the scaling in relation to text  XYZ (12 months)
Lines of text below the sparkline showing that the sparkline does not affect the leading of the text in any way.

Figure 9: Example of Edward Tufte’s “sparkline” data visualization method

In a study that investigated the effect of information presentation on decision-making, Speier et al. (2003) provide useful terminology to make the distinction between the cognitive processing of numerical data and visual information; they refer to “analytical processing” for numerical calculations and “perceptual processing” for visual analysis.¹²⁴ The authors use the theory of cognitive fit (CFT) to support their research. CFT suggests that tables of numerical data are most appropriate for presenting discrete sets of symbols, while graphs are most appropriate for depicting relationships amongst symbols. When an inappropriate format is used for presenting information, the decision-maker must exert greater cognitive effort, which results in decreased performance. Speier et al. note that information overload leads to the breakdown of analytical processing:

¹²² Donderi, D.C. and McFadden, S. (2004). A single marine overlay is more efficient than separate chart and radar displays. *Displays*, 24 (4–5): 147–155.

¹²³ Tufte, E. (2013). Sparkline theory and practice. http://www.edwardtufte.com/bboard/q-and-a-fetch-msg?msg_id=000iOR.

¹²⁴ Speier, C., Vessey, I. & Valacich, J.S. (2003). The Effects of Interruptions, Task Complexity, and Information Presentation on Computer-Supported Decision-Making Performance. *Decision Sciences*, 34(4): 771–797.



As the complexity of a symbolic task increases, a point is reached at which decision makers can no longer use analytical processes regardless of the accuracy desired. This juncture occurs when the cognitive load is so high that decision makers do not have sufficient capacity to process information cues analytically. (p. 778)

For this reason, the two types of information processing are suited to different levels of task complexity, and there is a point at which the effectiveness of the two processes crosses over. A symbolic task at moderate levels of complexity is more quickly and accurately solved with analytical processing, but as the task complexity increases, visual processing of graphs outperforms analytical processing of tabular data. Furthermore, when time pressures and interruptions increase the cognitive load of complex tasks, the crossover point occurs sooner.¹²⁵

Decision-making relating to HE is understood to be a complex task, due to the large amount of information to be processed, the number of variables to be considered and the uncertainties involved in calculations of costs and benefits. The implication for the presentation of information relating to HE decision-making is that data visualization may offer a solution to some of the problems reported by users of existing information resources. For example, participants in the early evaluation of Unistats reported being “overwhelmed by data”. The problem was that “the data tables presented to aid comparison are frequently long and complex” (CRAC & iCeGs, 2012, p. x). As we have seen in the example of Anscombe’s quartet, it is difficult to find meaningful information in tables of numerical data. But evidence from research in decision-making suggests that data visualization has the potential to ease the burden on prospective students and thereby improve the effectiveness of (and, ultimately, their satisfaction with) their final decision.

¹²⁵ Baron, R.S. (1986). Distraction-conflict theory: Progress and problems. *Advances in Experimental Social Psychology*, 19: 1–39.

APPENDIX 4: LIST OF ABBREVIATIONS

BIS	Department for Business, Innovation and Skills
CFT	cognitive fit theory
DCE	discrete choice experiment
DELNI	Department for Employment and Learning – Northern Ireland
DfE	Department for Education
DLHE	Destination of Leavers from Higher Education survey
HE	higher education
HEA	Higher Education Academy
HEFCE	Higher Education Funding Council for England
HEFCW	Higher Education Funding Council for Wales
HEI	higher education institution (e.g. a university)
HEPISG	Higher Education Public Information Steering Group
IAG	information, advice and guidance
ICT	information and communications technology
KIS	Key Information Set
MINDSPACE	an acronym for a collection of principles from behavioural psychology; also the title of report by Dolan <i>et al.</i> (2010).
NSS	National Student Survey
NUS	National Union of Students
SFC	Scottish Funding Council

