

UNDERSTANDING THE BEHAVIOURAL PARADIGM IN PROPERTY RESEARCH

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ABSTRACT

To seek its definition, the behavioural approach to real estate research fits into a model of research paradigms. The general framework, underlying psychological theories, data generation and data evaluation methods for the approach are identified. The existing literature is organised and discussed. The findings support the view of the real estate decision maker as a problem solver seeking efficiency and pursuing potentially biasing simplifying heuristics to overcome limitations in human information processing. Some results are consistent with an agency bias and the hypothesis that some heuristic behavior may be the unconscious, routinised response to pervasive agent-client concerns.

Keywords: Human information processing, heuristics, behavioural paradigm, real estate research.

INTRODUCTION

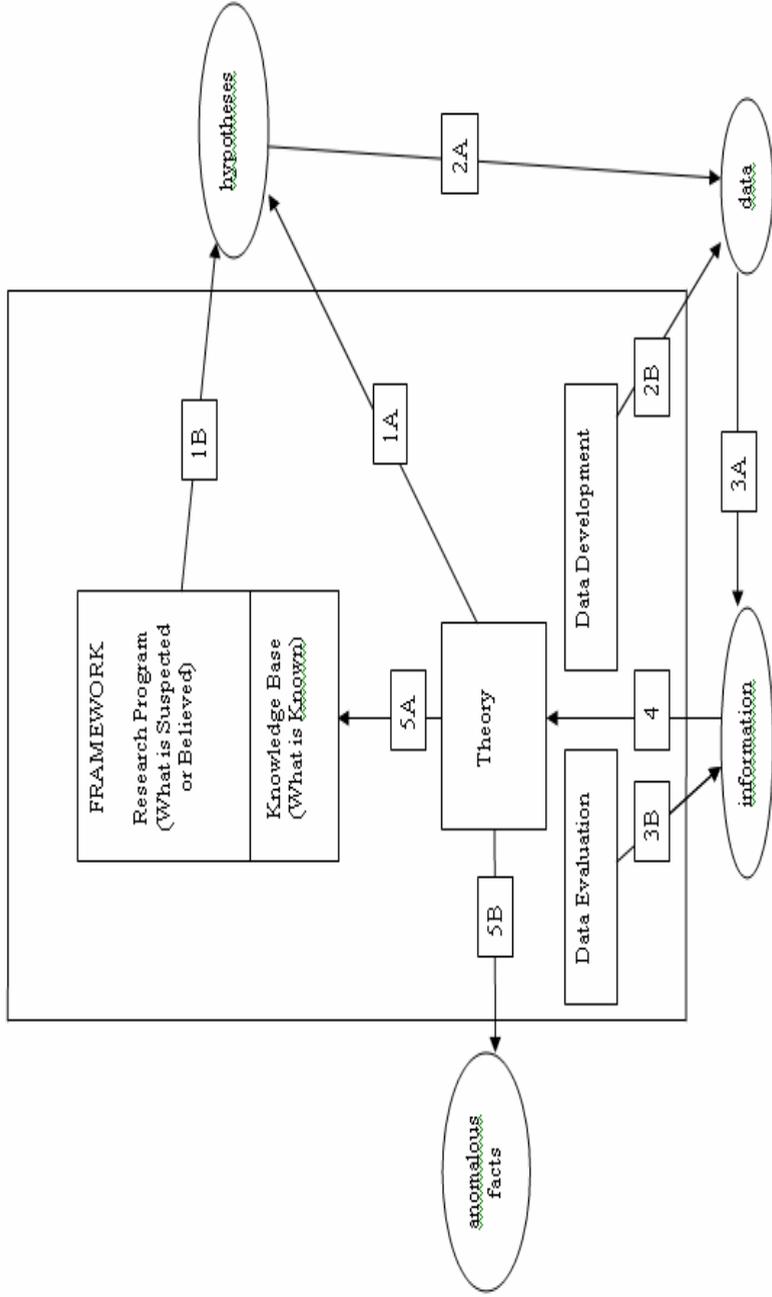
As a descriptive discipline, real estate is charged with the task of understanding real estate decision-making. Because it has realized that human behavior is predictable but complicated, a growing community of researchers has forsaken the economic-based tools of finance for tools of psychology. These new approaches and the literature that has emerged are often called ‘behavioural research.’ Despite the frequent use of this term, at present real estate behavioural research is not well understood.

Broadly, all real estate research is behavioural since it aims to explicate real estate decision-making or to improve it. In this sense both Ratcliff (1972) and Graaskamp (1991) were early behaviorists arguing that the property discipline is applied social science. Yet it is in a much more narrow sense that behavioural research has gained its recent currency. To seek a description of its more narrow and emerging sense, behavioural research is fitted to the model of a research paradigm developed by Diaz (2000). In the next section, behavioural real estate research is defined and components of the research paradigm are discussed. This section is followed by an organisation and review of the behavioural literature.

BEHAVIOURAL REAL ESTATE RESEARCH AS A PARADIGM

According to Diaz (2000), a research paradigm is a knowledge production system where critical components are its framework, theory, data development methods, and data evaluative methods (as shown in Figure 1). A paradigm's framework defines the territory of the discipline indicating the discipline's knowledge base and what the discipline does not yet know, but may suspect because of suggestive theory. This area of what is unknown but probably suspected delimited within the framework forms the discipline's research programme or agenda. The work of researchers who adhere to the paradigm is to convert suspected beliefs into knowledge by the identification of supporting evidence; a process that Kuhn (1996) calls 'puzzle solving'. The paradigmatic conversion process of building knowledge from beliefs is depicted in Figure 1 and operates as follows: theory applied to situations not yet observed generates formal statements of belief called 'hypotheses'; then data development methods are applied to hypotheses to generate relevant data. Following on, evaluative methods are applied to data to generate information; and information is structured by theory into the framework, expanding the knowledge base and shrinking the unknown territory. Information that is inconsistent with theory and therefore can not be structured into knowledge is set aside as anomalous facts.

Figure 1: Paradigmatic knowledge production system



The critical components of behavioural research as a knowledge production system or paradigm, set out in Table 1, are the human information processing theory of Newell and Simon (1972); the framework of the real estate activities model (Diaz, 1993); data development techniques of field surveys, process tracing protocols, and controlled experiments; and parametric and nonparametric comparative statistics as evaluative methods. These components are discussed further in the next two sections.

Table 1: Paradigmatic components of the behavioural approach

DIMENSION	COMPONENT
Theory	Information Processing Theory of Human Problem Solving (Newell and Simon, 1972; Simon, 1978)
Framework	Activities Model (Diaz, 1993)
Data Development Methods	Primary Data Generation Via: Field Surveys Process Tracing Protocols Controlled Experiments
Data Evaluation Methods	Parametric and Nonparametric Statistics, Analysis of Variance

THEORY AND FRAMEWORK

Real estate behavioural research has evolved out of the process tracing tradition of investigation into human information processing. Research in this tradition is characterised by a concern for the dynamics of real world problem solving including problem definition, hypothesis generation, information search and

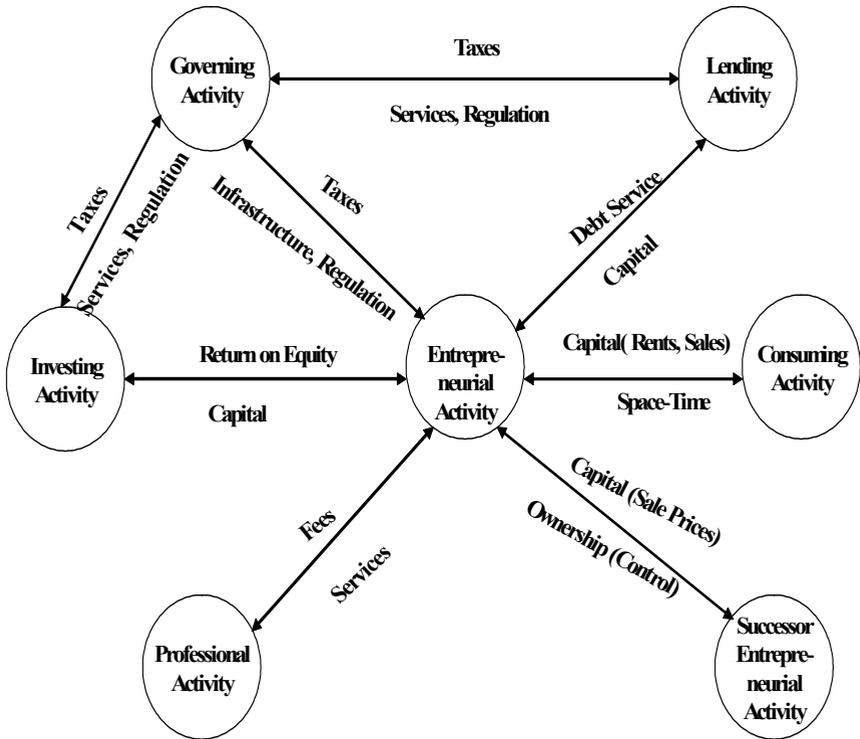
information processing. The theoretical base for this tradition is founded in the information processing theory of human problem solving developed by Newell and Simon (1972) and further refined by Simon (1978). This theory views the human mind as a serial information processor that, because of limited capacities, must solve problems within a 'problem space.' A problem space as formed in human short-term memory consists of a set of nodes or possible states of knowledge about the problem at some particular point in time. Short-term memory is capable of holding only up to about seven symbols representing information or 'chunks' of information. It is this short-term memory limitation that creates the need for the human problem solver to seek cognitive short cuts called 'heuristics.' Unlike short-term memory, long-term memory is essentially unlimited.

Problem solving in well structured domains is modeled as interactive behavior between three major components: the information processing system (the human problem solver), the task environment, and the problem space. Critical problem information is imported from the task environment and/or long-term memory into short-term memory. This forms the initial problem space. Each item of critical information resides symbolically as a knowledge state in a node within the problem space. A solution is achieved by moving or 'searching' serially from one knowledge state to the next within the evolving problem space until the current set of nodes includes that state of knowledge representing the solution. Systematic search through the problem space is carried out in the following manner. Upon reaching a particular node, the problem solver chooses an operator from an available set of operators and applies it to the node to create a new knowledge state. The search may proceed from this node or the node may be abandoned in favor of a previously reached node, although because of short-term memory constraints, the ability to 'backtrack' is limited. Ill-structured problem solving is modeled as a series of well-structured sub-problems, where problem solving occurs within a well-structured problem and problem space is continually modified through retrieval of new information from long-term memory. Solution then is accomplished via a search through a continually evolving problem space.

The information processing theory of human problem solving suggests that three characteristics, namely serial processing, limited short-term memory and unlimited long-term memory, collectively shape human problem solving behavior. When applied to a discipline's territory or framework, this view of human behavior generates hypotheses. A behavioural framework for the real property discipline is provided by the activities model first by Diaz (1993) and illustrated in Figure 2. Basic to this definition of real property are the two modeling components of economic activity: (a) the process of generating the supply of or demand for some economic good and (b) allocation activity, *i.e.*, markets. Real estate is conceptualised as a space-producing process made up of centres or nodes of economic activity sewn together in a network of markets that allocates goods and services provided within activity centres to other activity centres. Critical activity centres would include lending and investing that fuel the system with capital, in

Figure 2

Real Property Activities Model



turn providing regulatory protection and infrastructure, as well as entrepreneurial activity that provide space to space consumers.

Real estate is portrayed as a system of interlocking decision-making behaviours. Since all of these decision-making behaviours (*e.g.* lending, investing, consuming, governing, entrepreneurial) need to be understood and improved, both the positive property scientist and the normative property engineer may choose to focus on any one of these activity centers. Therefore, the model becomes not only a descriptive framework but a research programme as well. Theory applied to the research programme (refer to arrows 1A and 1B in Figure 1) creates hypotheses, which must be tested. To test hypotheses, data need be generated and evaluated were the techniques of data generation and evaluation are discussed further in the next section.

BEHAVIOURAL RESEARCH METHODS

Techniques of Data Development

To examine behavioural hypotheses, sophisticated methods are used to generate straightforward primary data (refer to arrows 2A and 2B in Figure 1). So far, three data development techniques have dominated real property behavioural research. All three techniques, namely the field survey, the process tracing protocol, and the controlled experiment were borrowed from the behavioural sciences where they have an established foundation. The field survey is important for revealing attitudes and opinions, which in turn frequently yields results that serve as guiding hypotheses for more structured follow-up research. Because decision makers are often unaware of their own internal decision making processes, perceptions of behaviour can differ from actual behaviour, and field survey findings can be limited. Nonetheless, real property field survey work is important, refer to Gallimore (1994); Gallimore (1996); Gallimore and Wolverson (2000); Kinnard, Lenk and Worzala (1997); and Wolverson and Gallimore (1999). A variation on the field survey, referred to as the intensive interview, has also been used effectively (Levy and Schuck, 1999).

Methods that capture actual human decision-making processes without relying on introspection overcome field survey limitations. These process-tracing methods were first adapted for real estate investigation by Diaz (1990a) and subsequently employed by Hardin (1997). In a typical study, subjects are asked to solve a problem, such as providing a valuation judgment or a loan underwriting decision, by requesting relevant information as needed. By carefully recording the sequence of requested and utilised information, a subject's problem solving process can be traced. Procedures that conceptualise problem-solving processes as probability distributions have been developed to facilitate statistical comparisons between processes (Diaz, 198; Diaz, 1990a). Using these statistical procedures, both positive and normative comparisons can be made.

Controlled experiments are powerful tools for collecting evidence of causality or internal validity because they offer the researcher the opportunity to isolate the impact of key explanatory variables and control for the impact of exogenous influences. The greatest weakness of the approach is the generalisability or external validity of results across settings, persons, and time. In the early stages of a research programme, concerns over external validity are greatly outweighed by the need to propose causal relationships that can be tested and further examined. Therefore, the controlled experiment has therefore been a popular tool among real property behaviourists; see Diaz (1990b); Black and Diaz (1996); Wolverson (1996); Black (1997); Diaz and Hansz (1997); Diaz and Wolverson (1998); and Diaz, Zhao and Black (1999).

Techniques of Data Evaluation

Because data generated from behavioural techniques of data development tend to be straightforward, they can be evaluated using basic comparative statistics (refer to arrows 3A and 3B in Figure 1). Whenever sample sizes are sufficiently large, a normal sampling distribution can be assumed and parametric procedures such as the normal or Student's *t* test and analysis of variance (*F* test) can be followed. Unfortunately, behavioural data generation techniques often make observations expensive and large sample sizes are not always practical. In these cases, nonparametric procedures offer useful alternatives. The Wilcoxon signed rank test is a one sample or paired sample nonparametric analogue to the Student's *t* test whereas the Mann-Whitney-Wilcoxon test is a two independent samples analogue, where the Kruskal-Wallis test is a nonparametric analogue to one-way analysis of variance. Note that the loss of statistical power relative to parametric tests can be quite small as well, where statistical power refers to the ability of a test to detect significant differences. For example, for each of the three nonparametric tests reported as parametric analogues, the asymptotic relative efficiency is 0.955. In other words, this means that the nonparametric test with 100 observations is about as powerful as its parametric analogue with 96 observations (Gibbon, 1976).

Turning Information into Knowledge

Data subjected to statistical evaluation becomes information, but to become knowledge, information must be filtered through theory (refer to arrow 4 in Figure 1). If the information is consistent with theoretical expectation, then it is incorporated into the base knowledge of the framework (refer to arrow 5A in Figure 1) increasing the knowledge base of the discipline and reducing the number of assumptions. If statistical evaluation of data leads to information that is inconsistent with theoretical expectation, it is rarely viewed as disproving theory but rather labeled as anomalous fact and generally set aside. The accumulation of anomalous facts can be challenging from a theoretical perspective, but anomalous facts alone are not sufficient to overthrow a paradigm. Otherwise the financial/economic paradigm with its theoretical underpinning of rationality would have been replaced a long time ago. As long as a paradigm supplies meaningful work for its disciplines, or as long as there is a research programme with a set of

beliefs that require evidence to convert it to knowledge, a research paradigm is likely to be established.

As a research paradigm, behavioural real estate is in its infancy but knowledge has nonetheless been engineered. What researchers have been able to discover when working within the behavioural real estate paradigm is showcased in the next section.

THE BEHAVIOURAL LITERATURE

Early real property behavioural research examined the valuation processes of professionals. Today the bulk of the investigative product remains in this area although lending activities and negotiation activities have also been studied. There are at least three reasons why research into the valuation process has dominated the early stages of the behavioural research programme. First, valuation processes substantially influence value formation in property markets characterized by a critical lack of transaction information. Secondly, valuers are a relatively easy target for research purposes since they are a well-defined and accessible group with widely accepted normative models. These normative models that provide accepted definitions of what valuation processes ought to be also provides a platform to examine what valuation processes actually are. Thirdly, many early behaviourists were themselves valuers giving them important advantages, from designing experiments to interpreting results, in conducting behavioural research of valuers. The behavioural pursuit of valuation processes decomposes into four categories, departures from normative models, comparable sale selection, valuation biases, and agency-related impacts or feedback.

Research into normative versus descriptive processes was initiated by Diaz (1990a). In this study, the actual valuation processes of expert residential valuers were found to differ substantially from normative models. Whereas the normative valuation process is fundamentally deductive commencing at the widest possible focus, valuers in this experiment used a more efficient, inductive process that began with the subject property. Adair, Berry, and McGreal (1996) concluded that residential valuers in their UK investigation viewed critical property characteristics differently from actual market participants. This questions both the appropriateness of normative valuation methodologies and positive models of value formation. Diaz, Gallimore, and Levy (2004) extended the study of normative and descriptive valuation behaviour to the United Kingdom (UK) and New Zealand (NZ). In this cross-culture comparative study, they found that the United States (US) normative model was cognitively demanding and departure was common, regardless of culture.

The comparable sale selection processes used by experts were described and contrasted with novice selection processes by Diaz (1990b). Expert residential

valuers used screening strategies not employed by novices. Experts also tended to consider less data as compared to novices suggesting the potential for sub-optimal and even biased results. The potential for biased results in comparable sales selection was also studied in Wolverton (1996) and by Gallimore and Wolverton (1997). These studies produced evidence that knowledge of subject property transaction prices could bias comparable sales selection as well as final value judgments. Both US appraisers and UK valuers were found to be susceptible to these biases but to differing degrees; presumably due to differences in valuation culture. Diaz, Gallimore, and Levy (2004) noted that US appraisers and NZ valuers operating in cultures requiring disclosure examined more comparable sales than UK valuers where disclosure in the UK is uncommon.

Inspired by Tversky and Kahneman's (1974) work in heuristic problem solving, investigation into bias in valuation judgment is an important theme within the body of behavioural property research. Gallimore (1994) found that valuers might inappropriately give greatest weight to the most recently considered information. Evidence of a confirmation bias was uncovered by Gallimore (1996) where expert valuers indicated they make early, preliminary value judgments and then seek evidence in support of these early opinions. Havard (1999) found an upward bias among student valuers who were more likely to adjust a low valuation upward than a high valuation downward. Diaz and Hansz (1997) found that experts operating in geographically unfamiliar markets were influenced by anonymous expert opinions, but Diaz (1997) discovered no evidence that expert valuers operating in markets familiar to them were influenced in this manner. Market ambiguity leading to valuation uncertainty appears to be a critical factor triggering these anchoring behaviours. Working with expert valuers in unfamiliar markets, Diaz and Hansz (2001) uncovered other significant reference point anchors including unclosed contract prices on subject and comparable properties. Despite strong anchoring tendencies by novices, Cypher and Hansz (2003) found that expert appraisers disregarded a property's assessed value, an unsanctioned anchor, in forming valuation judgments. With a substantial amount of work undertaken with respect to anchoring behaviours in expert valuation judgment, it does appear that potent anchors require content validity.

The tendency of valuers to use their own previous value judgments as anchoring reference points was identified in Diaz and Wolverton (1998). Seeking a behavioural connection to the valuation-smoothing hypothesis, this study demonstrated that valuers inadequately updated their previous value judgments, they anchored to their previous valuations, and finally they tended to make adjustments to these previous valuations that are inadequate in light of the available market evidence. Hansz (2004) found that valuers inadequately anchor on prior transaction price knowledge and implications to valuation smoothing was discussed.

Some of these anchoring results, notably Diaz and Hansz (2001), are consistent with agency-related bias. Thus, agency-related bias is hypothesised to occur when valuers are motivated to meet the expectations of their clients. Since there is no agent-client stimulus in hypothetical experimental exercises, there is a temptation to conclude this behaviour is not related to agent-client bias, but this conclusion is premature. Some anchoring behaviour may originate from agent-client concerns that become so pervasive that they exert influence even in situations that are agent-client neutral. In these cases, anchoring may be an unconscious, routinised response to general agent-client concerns rather than an unconscious, routinised management of cognitive limitations.

Behavioural investigations into the influence of client expectations and pressure generally employ survey methods and are often labeled feedback studies rather than agency-client studies. For example, Kinnard, Lenk and Worzala (1997) surveyed US valuers and found some evidence that valuers may be willing to change valuation conclusions in response to client pressure. Wolverton and Gallimore (1999) also employed a survey and concluded that the perceived valuation aim of US appraisers is strongly related to the degree and nature of client feedback. This study was not able to replicate the result in a survey of UK valuers (Gallimore and Wolverton, 2000). In a series of intense interviews conducted of New Zealand valuers, Levy and Schuck (1999) supported the belief that valuers adjusted their value opinions or reported value estimates in the face of client influence. Furthermore, the same research concluded that a wide range of valuer as well as client characteristics influenced the magnitude and direction of the client-induced bias. Finally, Hansz (2004) introduced a pending mortgage reference point into the experimental anchoring studies and found evidence of valuation bias.

More direct evidence of the biasing impact of feedback was found in the controlled experiments reported by Hansz and Diaz (2001). Participating expert valuers were presented with the subject sales contract *after* they valued the property. If the contract amount was greater than the estimated value, valuers tended to adjust their next unrelated valuation judgment upward. If the contract were less than the estimated value, no downward adjustment was made on the next, unrelated valuation. This evidence is consistent with the view of anchoring as a routinised response to pervasive agent-client concerns.

As well as in the area of valuation, important behavioural research has been conducted in banking and negotiation. Hardin (1997) applied process tracing techniques to loan officers and found that a lender's perception of the attractiveness of a potential loan was a function of the lender's training and experience. When considering the same loans, lenders with business lending training and experience consistently made recommendations in direct contrast to those made by lenders with property lending training and experience.

The anchoring role that asking price plays in property negotiation was explored in a series of controlled negotiating experiments detailed by Black and Diaz (1996), Black (1997), and Diaz, Zhao and Black (1999). Property professionals as well as real property students gave inappropriate weighting to asking price in these experiments. This tendency held even when asking price was incongruous with available market data and when a reward system contingent upon negotiating performance was in place. Even with penalties for poor negotiating outcomes, student subjects in these controlled experiments negotiated poor settlements by devaluing cognitively demanding market data in favor of incongruous asking prices. Aycock (1999) designed a set of experiments to test the relative strengths of asking price versus initial purchase price as anchors in negotiated settlements. Among the property professionals serving as subjects, Aycock found no evidence that initial purchase price exerts a greater influence on settlement prices than relatively low asking prices, however did find evidence that relatively high asking prices had a greater influence on settlement prices than did initial purchase price. There was also no support for the contention that buyer knowledge of initial purchase price had substantial influence on final settlement prices either in low or high asking price environments.

Tables 2-6 encapsulate the behavioural literature where Table 2 summarises the work on departures from normative valuation models, Table 3 comparable sales selection processes, Table 4 bias in valuation judgment, Table 5 valuation pressure and feedback, and Table 6 the banking and negotiation literature.

Table 2: Departures from normative valuation models

Study	Findings
Diaz (1990a)	Residential valuation experts departed from inductive normative models and employed deductive processes.
Adair, Berry, McGreal (1996)	Residential valuers viewed critical property characteristics differently than did market participants.
Diaz, Gallimore, Levy (2002)	Cross-culture comparison between US appraisers, UK valuers, and NZ valuers. Non-normative behavior found across cultures and descriptive models developed.
Diaz, Gallimore, Levy (2004)	Appraisers (US) and valuers (UK and NZ) find the US normative model cognitively demanding and departure is common regardless of culture.

Table 3: Comparable sales selection

Study	Findings
Diaz (1990b)	Expert residential appraisers used screening strategies not employed by novices but considered less data.
Wolverton (1996)	Knowledge of subject transaction prices biased comparable sales selection among US appraisers.
Gallimore and Wolverton (1997)	Knowledge of subject transaction prices influenced comparable sales selection among UK valuers but to a different degree than it did US appraisers.
Diaz, Gallimore, Levy (2004)	Appraisers (US) and valuers (NZ) operating in cultures requiring disclosure examined more sales than UK valuers where disclosure is uncommon.

Table 4: Bias in valuation judgment

Study	Findings
Gallimore (1994)	Valuers gave inappropriate weight to the most recently considered data (recency effect).
Gallimore (1996)	Valuers tended to make premature judgments and then to seek evidence to support their early opinions (precipitance).
Havard (1999)	Student valuers were more likely to adjust a low valuation upward than a high valuation downward.
Diaz and Hansz (1997)	Experts in unfamiliar markets were influenced by anonymous expert opinions due to market ambiguity.
Diaz (1997)	Experts in familiar markets were not influenced by the opinions of anonymous experts.
Diaz and Hansz (2001)	Experts overly influenced by unclosed contract prices on subject and on comparable properties.
Diaz and Wolverton (1998)	Expert appraisers anchored on their previous valuations and made insufficient updating adjustments in light of available market evidence (appraisal smoothing).
Cypher and Hansz (2003)	Nonappraisers (novices) gave significant weight to a property's assessed value, an anchor with questionable content validity, when forming valuation judgments. In contrast, expert appraisers did not give credence to an assessed value anchor.
Hansz (2004)	Expert appraiser anchored on prior transaction price knowledge and potential implications to appraisal smoothing are discussed.

Table 5: Agency-related impacts (pressure and feedback)

Study	Findings
Kinnard, Lenk, Worzala (1997)	US appraisers may be willing to change valuation conclusions in response to client pressure.
Wolverton and Gallimore (1999)	The perceived valuation goal of US appraisers is strongly related to degree and nature of client feedback.
Gallimore and Wolverton (2000)	In terms of the perceived valuation goal, UK valuers did not show the same response to client feedback as did US appraisers.
Levy and Schuck (1999)	Valuers in NZ seem to adjust value opinions and/or reported value estimates in response to client feedback. Magnitude and direction of client-induced bias are influenced by valuer and client characteristics.
Hansz and Diaz (2001)	When presented evidence that previous value judgments were too low, experts adjusted unrelated judgments upward but did not make downward adjustments in face of evidence that previous judgments were too high.
Hansz (2004)	Appraiser valuation judgment did appear to be influenced by a pending mortgage reference point. Although found in an artificial environment, these anchoring findings may be a routinised responses to agent-client concerns.

Table 6: Non-valuation findings (lending and negotiation)

Study/Area	Findings
Hardin (1997) Lending	When considering the same loan, lenders with business lending experience made recommendations opposite of those from lenders with real estate lending experience.
Black and Diaz (1996) Negotiation	In negotiation exercises, property professionals and students gave too much weight to asking price.
Black (1997) Negotiation	Property professionals gave inappropriate weight to asking price even when contradicting market data were available.
Diaz, Zhao, Black (1999) Negotiation	With performance rewards and poor performance penalties, students negotiated poor settlements by devaluing cognitively demanding market data in favor of incongruous asking prices.
Aycock (1999) Negotiation	In negotiation exercises, asking price generally exerted a greater influence on settlement prices than initial purchase price even with buyer knowledge of previous purchase price.

The behavioural paradigm is relatively new and has focused primarily on valuation decision-making behaviours and the anchoring and adjustment heuristic. Although there is still important valuation-related work to be done, future behavioural research will spread into other property activity nodes. Other heuristics such as representativeness, availability, and recency found in general human behavior and the cognitive psychology literature have not been fully investigated in a real estate context. Behavioural perspectives such as over-reaction, over-confidence, and sentiment have received attention in the economic literature and these human tendencies may have important implications for real estate decision-makers. There is undoubtedly a multitude of real estate decision making behaviours to be investigated and research methods to be perfected.

CONCLUSION

As a research paradigm, behavioural real estate research possesses a framework, also known as the activities model, a guiding theory, also referred to as the information processing theory of human problem solving, and effective research

methods. Thus far, behavioural investigation has focused primarily on valuers, examining issues of descriptive versus normative processes, comparable sales selection, sources of valuation bias, and agent-client impacts. The gathered evidence supports the view of the valuer as a decision maker seeking problem solving efficiency and pursuing simplifying heuristics to overcome information processing limitations. The use of these efficient processes can become routinised and their automatic employment may lead to biases. Results in negotiation exercises and among banking underwriters lead to similar general conclusions. Some of the observed behaviour is consistent with an agent-client bias and supports the view that some heuristic behaviour may be the unconscious, routinised response to pervasive agent-client concerns.

The behavioural approach to real estate research has contributed to our understanding of expert behaviour in real property decision-making. This contribution suggests that behavioural research effort in other areas such as investor and consumer behaviour should be beneficial. A blending of behavioural results and methods with more traditional approaches to real property research should benefit both positive and normative goals of the discipline.

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