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The impact of institutions on the decision how to decide

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Abstract: Institutions influence and shape behaviour. This paper suggests one way in which they do so that has been largely overlooked in institutional analysis and design. When faced with a decision or problem, people have more than one mechanism at their disposition for addressing it. The human mind offers multiple tools, ranging from conscious deliberation to spontaneous, affective reactions. Relying on technology or experts, decision-makers can also muster additional resources. Often, the meta-choice of which decision-making or problem-solving mode is used has an impact on the output. Some normative goals are more likely met if the decision-maker uses a specific problem-solving mode. We argue that the meta-choice of which problem-solving mode to use for a given decision can be influenced by institutions. In the interest of defining access points for institutions, we develop a conceptual framework for the selection and implementation of decision-making and problem-solving modes.

1. The Issue

The human mind is not a general problem-solving machine. Instead of deliberately and analytically processing all available information to calculate which action will provide the greatest expected utility, people can and do rely on routines, rules, roles, or affect when deciding what to do in a given situation. They can also bring in information technology or experts to provide advice. Alternative processes used to arrive at a decision would not be of much general interest if the outcome of our decisions were not influenced by the mode in which we arrive at them. However, there is incontrovertible evidence that *how* we decide often determines *what* we decide (see, e.g., Weber and Lindemann, 2007). This explains why institutional designers frequently attempt to influence the choice of the problem-solving or decision-making mode. To show how this can be brought about, we develop a conceptual framework that allows us to define access points for institutions.

There are two potential counter-arguments against our claim that institutions change behaviour by influencing people's choice of decision mode: one pragmatic, the other one normative. On pragmatic terms, some have argued

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that institutions are ill-equipped to bring about change or social betterment. According to Clarence Ayres, all institutions are merely 'ceremonial', whereas, by contrast, technology is 'instrumental' (Ayres, 1944). We need, however, a very narrow definition of institutions to uphold this claim (Hodgson, 2004a: 359).[1] While institutions frequently buttress status and power, it is also true that this purpose is best served if the institution indeed helps solve a social problem (Knight, 1992). At any rate, we restrict ourselves to institutions that have more than a ceremonial function and make the (modest) claim that the decision of how to decide is not fully determined by other (and merely ceremonial) institutions.

On normative grounds, we may regard interventions that target mental mechanisms as manipulative. If the ultimate goal of such intervention is to improve the welfare of individual decision-makers, we may also classify it as paternalistic. While acknowledging this normative point (for a summary account of the philosophical discourse see Dworkin, 2005), this paper simply attempts to demonstrate that institutions have an effect on the decision how to decide, and that such influence can have an impact on the ultimate behaviour of the decision-maker. We are not offering a general theory of when such intervention might be desirable, but only want to demonstrate that institutions can and do effectively target the decision of how to decide.

There have been many attempts to define institutions, and to explain their social function (Hodgson, 1988; DiMaggio and Powell, 1991; Rutherford, 1994; Hall and Taylor, 1996; DiMaggio, 1998; Nee, 1998; Peters, 1999; Mantzavinos, 2001; Ostrom, 2005; Hodgson, 2006). Douglas North's definition serves our purposes well: 'Institutions are . . . the humanly devised constraints that shape human interaction' (North, 1990: 3). Since we only address the behaviour of individuals and not of collective or corporate actors, this definition coincides with Geoffrey Hodgson's: 'Institutions [are] systems of established and prevalent social rules that structure social interaction' (Hodgson, 2006: 2), with a rule defined as 'a socially transmitted and customary normative injunction or immanently normative disposition, that in circumstances X do Y' (Hodgson, 2006: 3). For us, it is particularly helpful to stipulate that a rule must (only) be 'potentially codifiable' (Hodgson, 2006: 3). The people whose behaviour the institution is designed to shape may have only tacit, not explicit knowledge of them, and the institution may not be purposefully designed, but may emerge instead (Hodgson, 2006: 11). We have no reason to quarrel with the claim that persons and institutions, in a reflective manner, constitute each other (Tool, 1979: 52; Lawson, 2003: 40; Tool and Bush, 2003: 10; Hodgson, 2004a). For

1 Terminology apart, Ayres does not seem to disagree: 'The history of the human race is that of a perpetual opposition of these forces, the dynamic force of technology continually making for change, and the static force of ceremony – status, mores and legendary belief – opposing change (Ayres *Economic Progress* (1944) end of chapter VIII). Ayres' pupil Foster has departed at this very point from his academic teacher, and defined institutions as being ceremonial and instrumental at the same time, Foster (1981). Foster's pupil Tool has adopted a similar position, Tool (1979: 73f).

Table 1. Decision modes

Mode	Sub-type	Inputs	Processes	Motivational focus
calculation	cost–benefit	• attributes • probabilities	• evaluation of options • comparison	maximization of material outcomes
recognition	case-based	holistic situations	• pattern matching • execution of if–then productions	• technical efficiency • accuracy
	rule-based	situational elements that trigger rule	• explicit categorization • execution of if–then productions	• 'doing the right thing' • fairness • justifiability • self control
	role-based	situational elements relevant to social role	• recognition of role-related expectations • execution	• connectedness • social identity • self-esteem
affect	wants	aroused physiological state	• positive/negative associations (classic conditioning) • learned approach or avoidance response (operant conditioning)	• fulfilment of wants • self-affirmation • autonomy

our purposes, we only need one of these two directions: from institutions to individuals.

The remainder of the article is organized as follows. Section 2 summarizes the multitude of tools people possess for decision-making and problem-solving. Section 3 provides an overview of previous work related to the arguments of the present paper. Section 4 develops a conceptual framework that explains how different problem-solving modes relate to characteristics of different decision-making tasks that people face. Section 5 uses this framework to suggest access points for institutions. Section 6 concludes.

2. Deciding how to decide: multiple modes of making decisions

Attempting to influence someone's decision about how to decide only makes sense if decision-makers possess more than one mental tool for the purpose. A large body of behavioral decision research has documented a broad range of qualitatively different ways in which people have been shown to decide on a course of action. Table 1 summarizes one suggested taxonomy of decision modes (Weber, 1998; Weber and Lindemann, 2007).

The taxonomy distinguishes between three classes of decision modes: calculation-based, affect-based, and recognition-based ways of making decisions, captured colloquially as decisions made by the head, by the heart, and by the book. These three classes of decision modes encode and utilize different situational inputs and apply different psychological processes. Calculation-based

decisions involve analytical thought. Affect-based decisions are based on immediate, holistic, affective reactions (Epstein, 1994; Damasio, 2000). In recognition-based decision-making, the decision-maker recognizes a decision situation as a member of a class for which a satisfactory action is known (Simon, 1990).

Recognition-based decisions come in different variants. In case-based decisions, the decision-maker is typically an expert in the domain under question, with a memory store of specific decision situations and their associated appropriate actions. These mental representations can be thought of as IF–THEN productions, where the IF element is a set of conditions that must be met in order to trigger the resultant action represented by the THEN part of the production. The expert decision-maker is able to unconsciously apply these production rules, which have been developed through repeated experience, as demonstrated in research with experts such as firefighters and jet pilots (Klein, 1998).

Another type of recognition-based decisions is rule-based decisions. These rules may be laws (IF you are driving and come to a red light, THEN you must stop) or other types of regulations (parental rules, self-imposed admonishments, societal norms, or company rules) (Prelec and Herrnstein, 1991). In role-based decisions, the decision context elicits a rule of conduct that derives from one of the social roles of the decision-maker (March and Heath, 1994). As a mother, IF your child is very ill, THEN you must stay home and care for him.

Weber and collaborators (Weber, 1998; Weber and Lindemann, 2007) propose that these different modes of making decisions coexist because each mode is better suited than others to address some human needs and motives. Calculation-based modes are best suited to maximize material consequences. Someone wanting to justify her decisions to a supervisor would be well-served by making her decision in a rule-based fashion. Role-based decisions satisfy the motives of connectedness and affiliation. The need for autonomy may be best met by using an affect-based decision mode, as a way of affirming that personal desire for an action suffices.

Multiple modes of decision making have been well-documented for a wide variety of tasks. The adaptive decision-maker program by Payne, Bettman, and Johnson showed that people strategically employ a wide range of decision strategies in the context of multi-attribute choice, e.g. when deciding which car to purchase (Payne *et al.*, 1988; Payne *et al.*, 1993). More recent work has demonstrated the strategic use of decision modes in inference tasks (Gigerenzer and Selten, 2001) and for risky decision-making tasks (Weber and Hsee, 2000; Weber *et al.*, 2004). The idea of multiple mental tools is also captured by a broad range of recent dual-process theories (Evans and Over, 1997; Chaiken and Trope, 1999; Stanovich and West, 2000; Bohner, 2001), which hypothesize that the human mind has two processing modes, one more analytic and reflective, the other more automatic and impulsive, that operate in parallel and can both compete and cooperate with each other (Strack and Deutsch, 2004).

The agenda of this paper goes beyond previous psychological research in its assumptions about the social context of decisions and actions. Some exceptions notwithstanding (Bandura, 1986), psychological studies typically concentrate on behaviour in abstract or standardized contexts. In reality, however, context is often shaped or even provided by institutions. Another shortcoming of existing versions of models of adaptive decision-mode selection is that they address the implicit selection of one or more ways of deciding between a set of choice options, rather than the more ill-defined situations more commonly encountered outside of the laboratory, which are better described as problem-solving tasks. When describing the work of managers, scientists, engineers, or lawyers, Simon (1986) distinguished between decision-making and problem-solving in the following way. He referred to the activities of fixing agendas, setting goals, and generating possible actions as *problem-solving*, and to the activities of evaluating and choosing between specified alternative actions as *decision-making*.

3. Previous work on the influence of institutions on decision-mode selection

Some work has foreshadowed the present paper by also aiming to understand how institutions affect the mental processes by which behaviour is generated, though none of it has been particularly similar. Closest in intention and coverage is work that explores the effect of institutions on behaviour that is not generated by deliberate reasoning, particularly the work that has focused on routines or habits (James, 1893: 143; Veblen, 1898: 390; Hodgson, 1988: 123–134; Vanberg, 2002; Hodgson, 2004b). Given that this is also the angle from which economists are most likely to approach the topic, we will discuss similarities and dissimilarities between this work and our framework. We start with the work of the founding father of this approach, John Dewey.[2]

Our approach agrees with Dewey on the following observations. People do not tend to employ formal logic when thinking. Deliberation is a much richer mental activity, although its product is frequently presented in logical terms. The presentation of the results of thought does not necessarily reflect the deliberative processes that generated the results. The deliberative process taps subconscious abilities and is chiefly concerned with the generation of meaning. It is driven by observation, guided by and dependent upon previous experience, and hence open to training (Dewey, 1933; further see Margolis, 1990: chapters 4–5). We further agree that deliberation is not the only tool the human mind offers for decision-making. Many if not most decisions are guided by either habit or impulse.

2 Among modern thinkers in the pragmatist tradition, two have some relation to our endeavour. Margolis, *Patterns* (1990) presents a cognitive theory that is based on pattern recognition as the basic unit. He, however, deliberately focuses on the history of science as a field of application, not on the kind of institutional interventions we explore. Joas, *Pragmatism and Social Theory* (1993) introduces pragmatist thinking into social theory and is therefore interested in (mostly informal) institutions. Neither of these authors, however, shares our psychological starting point: the multiplicity of mental tools.

Since habit is by definition acquired, the process of habit formation provides an important point of access for institutional designers into the way people make decisions. Frequently, it is easier to bring about a change in habits by changing the decision than by changing the way in which the decision is made (Dewey, 1922).

In other respects, however, we depart from Dewey's positions. We use a less encompassing definition of habitual decision-making, equating it neither with personality (cf. Dewey, 1922: I.II[38]) nor with disposition (cf. Dewey, 1922: I.III[44]), attitude (cf. Dewey, 1922: I.II[41]), or will (cf. Dewey, 1922: I.II[42]). We reserve the term for a description of one distinct mental tool, without any wish to deny that experience plays a role in other decision-making tools. Even for acquired tastes that are habits of some sort, a decision to buy a cone of ginger ice-cream for its sensory value will be based on affect. While habit, broadly speaking, might 'operate all the time of waking life' (Dewey, 1922: I.II[37]), we argue that only some, not all decisions are based on routine. While we do not deny a certain degree of flexibility in routine decision-making (chiefly due to the schematic delineation of the proper scope of a given routine), we do not conceptualize routines as permanently in active competition with each other (cf. Dewey, 1922: I.II[38 f.]). Normatively, we do not depreciate a routine as mechanical and dull, as opposed to an 'intelligent habit or art' (cf. Dewey, 1922: I.V[77]). While we agree that it is next to impossible to generate or change a habit on the spot, we suggest that habits can be changed through purposeful intervention (cf. Dewey, 1922: I.V[80]). More generally, while we agree that there may be interactions between habit, impulse, and deliberation, we do not think that the only sensible way to employ those three is as elements of one unitary process (cf. Dewey, 1922: IV.I[278]; Margolis, 1990: 4 and passim). Instead, we provide examples of situations where it seems plausible that any one of them is used in isolation.

Most importantly, however, the questions and goals of our research differ from those of Dewey, whose arguments are normative and explicitly address implications for morality (Dewey, 1922) and education (Dewey, 1933). If institutional designers want to turn our analysis into a piece of advice for policy-making, they too must answer a normative question, namely whether it is desirable to bring about the changes in behaviour that can be effected by changing people's use of decision mode, a normative question that differs from that posed by Dewey, who was a philosopher and philanthropist, not a social engineer. He had no interest in increasing the probability that decisions in one specific domain of practical life be made with the help of one mental tool rather than another, but studied the abstract way in which people make decisions, independent of their domain or content. We concur with Dewey's caveat about the difficulties for policy-making due to the fact that most behaviour has a habitual component, and habit is hard to change, but are less sceptical about deliberate institutional design (cf. Dewey, 1922: I.V[80]).

Modern writers have also looked into issues bordering on our topic. The legal literature on addiction normally assumes that institutions are needed to overcome socially or individually detrimental decision modes, yet is not concerned about how this is or can be done; a symposium bringing together psychologists and legal philosophers on this topic is one interesting exception (Corrado, 1999). Some of the literature on consumer protection also touches on the topic of this paper (Hanson and Kysar, 1999a, 1999b; Camerer *et al.*, 2003). Recently, there has been interest in the interaction between heuristic decision-making and the law (Gigerenzer and Engel, 2006), and in institutional arrangements that increase predictability. Predicting the behaviour of an interaction partner is difficult precisely because the human mind is not just one general problem-solving machine, but a modular device, which utilizes a variety of decision modes (Engel, 2005). The literature on heuristics and biases, with recommendations for debiasing (for a summary account see Jolls and Sunstein, 2006), considers a related issue, but typically focuses on the direct effect of institutions on behaviour, not on the more indirect strategy of targeting the mental mechanism by which this behaviour is generated. Earl's work (Earl, 2005) is one exception and argues that buying routines can make consumers vulnerable to seller manipulation.

Finally, the topic of our paper is linked to an interest of evolutionary economists in (what they have called) the meso level, i.e. generic rules and their population of actualizations (Dopfer *et al.*, 2004). This literature argues that the apparently stable behaviour of groups of individuals may have been generated by very different mental activity. Consequently, in future instances aggregate behaviour may be different even if the environment remains stable, and small changes in the environment may trigger apparently disproportionate changes in behaviour.

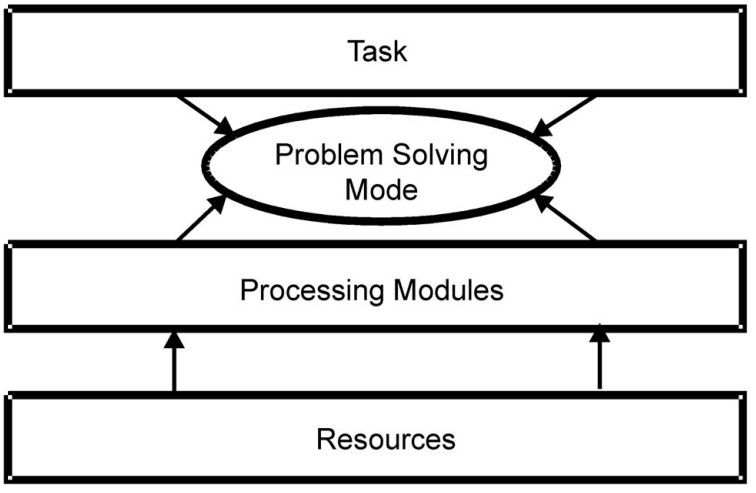
4. Problem-solving modes

The basic framework

Institutional designers are not necessarily interested in the processes by which people generate behaviour, but care about the resulting behaviour. In order to be useful for institutional analysis and design, our framework must therefore link the ultimate goal of behavioural change aimed at social betterment to the proximate goal of changing the decision about how to decide. Consequently, our framework is not confined to mental activity; it also has a task component. It defines problem-solving modes as tools for matching mental machinery to (perceived) task features, as shown in Figure 1 and further described in this section.

Individuals call on problem-solving modes when faced with a problem situation. While the problem-solving mode used in a given situation may be

Figure 1. Problem-solving modes



designed on the spot, we assume that it is usually preconfigured (see Table 2 below for some illustrations; in that table, each row is a problem-solving mode). If so, the decision about how to solve the problem at hand converts to the choice of an appropriate mode from the stock of existing problem-solving modes.

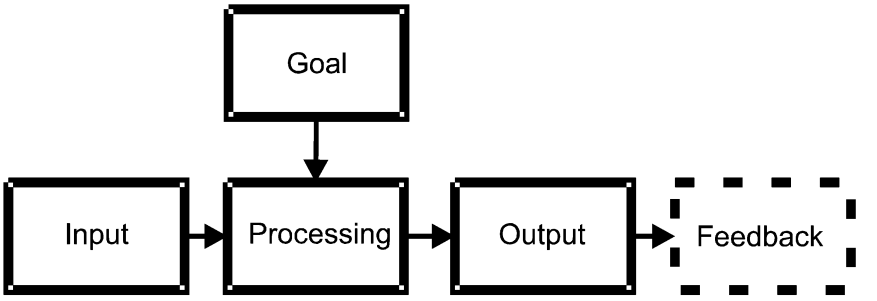
Problem-solving modes rely on processing modules. Standard modules include informational input, the design of a response, and the generation of an output. Each of the modules is assumed to have access to the appropriate resources needed to fulfil its functional task. For instance, if information is visual, the eye and brain regions needed for processing the sensory input are activated to translate the picture on the retina into meaningful information about the environment.

Different problem-solving tasks have different characteristics, needs, and constraints. If you spot a poisonous snake twenty yards away, it is paramount that you react fast. If your boyfriend has proposed to you, a spontaneous yes with a happy smile is good policy – but only if you have been expecting the proposal and have already carefully deliberated on whether this is the person that you want to spend the rest of your life with. Consequently, appropriate problem-solving modes selectively draw on input, processing, and output modules in light of the features of the task at hand. The problem-solving mode thus is the link between capabilities and task requirements.

Resources

Resources are listed as a separate component in our framework since they need not be internal. Technical progress has not left a single internal resource without an external substitute. Moreover, external resources often are not just substitutes, but are superior to internal resources. Take the task of adding up a series of large

Figure 2. Processing modules



numbers, where a calculator will outperform the human brain, both in speed and reliability. Normally, internal and external resources have their comparative strengths and weaknesses. A computer may have higher storage capacity than human memory, but it is worse at reconfiguring its stock of knowledge according to changes in interest or in the environment.

There are two principal sources of external resources: technology and people. Technical resources that facilitate decision-making or problem-solving are as old as writing and printing. Four eyes see more than two, and experts can bring their specialized knowledge and professional experience to a task. Groups are able to exploit the power of averaging out random error if each member reports an independent observation. Organized groups can extend the gains from specialization to task-specific interaction.

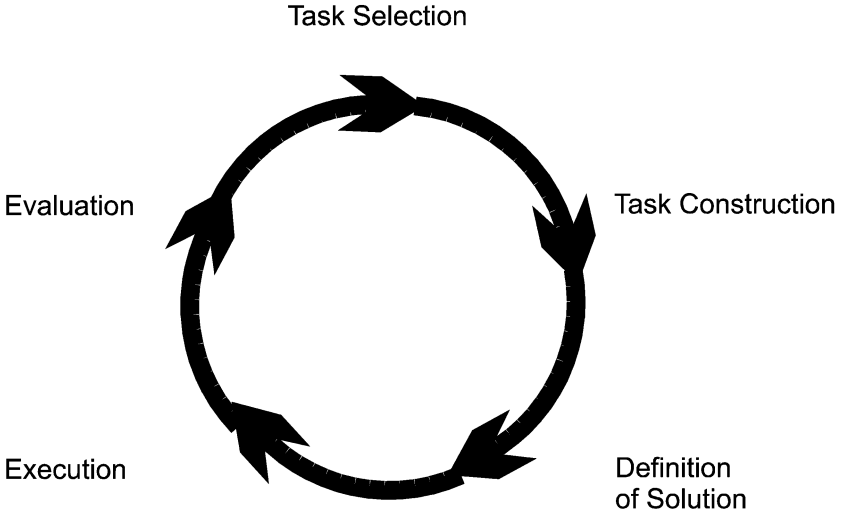
Processing modules

While there are a great variety of internal and external resources, the number of processing modules is strictly confined. Figure 2 provides a complete list.

Input from the environment is mentally processed in light of the goal to generate an output. Optionally, feedback informs the individual about consequences resulting from the output.

The operations of these modules vary widely. At the most basic level, an individual hears the horn of a car and jumps back on to the sidewalk. A single sound triggers the simple decision rule 'flee to safety', which the individual executes on the spot. At the opposite end of the range of complexity, an individual may read in the newspaper that, due to demographic change, the pay-as-you-go pension system is no longer sustainable. This piece of information induces her to consider alternative sources of retirement income. She consults some relevant literature, asks the human resources department about the pension plan of her company, and calculates her freely available income. With this information in mind, she gains an understanding of the problem of intertemporal choice she faces. How much consumption today is she willing to sacrifice for greater comfort after retirement? How long is she likely to earn a regular income? How long will she live? Is it important to pass money on to her children ? How should today's

Figure 3. Problem-solving cycle



savings be best invested? She thus goes through a complex process of generating further input and producing the criteria that ultimately direct her choice among alternative investments.

Tasks

Ideas similar to the task component of our framework have been developed in the analysis of individual and corporate decision-making (Simon, 1965: 54–56; Loasby, 1976: 88–91; Earl, 2005: 8 f.; Blackwell *et al.*, 2006: 77; also see Dewey, 1933: chapter 6). For a much more aggregate actor, namely the legislator, political science faces the same conceptual challenge. It must single out the necessary components of the decision-making process, which are placed in the policy cycle. While there are many versions of this cycle, a fairly stylized version (May and Wildavsky, 1978) has stood the test of time and lends itself to the analogy we propose to the processes faced by individual decision-makers. Figure 3 translates it into what we call the problem-solving cycle.

The cycle starts on the top, with task selection. On a normal day, we make hundreds, if not thousands of decisions. Should I turn right or left on my way to the train station? Should I help myself to another cup of coffee? Should I speak up at the business meeting? Should I prepare now for tomorrow's seminar? Should I extend my gym membership? Should I buy a new car? Should I accept the offer for a new job? Should I undergo elective surgery? Even with the help of external resources, considering all of them immediately can be beyond the individual's capacity, necessitating task selection.

In essence, task selection is about answering the question: Which of the many issues deserving of my attention should I consider at this point in

time?[3] This decision is influenced by both the current situation and by my values, needs, and goals. But the precise nature of the most pressing issue at hand is usually far from clear. Since problem definition therefore is not mechanical, our framework speaks of task construction. Is there a choice between exogenously specified alternatives, or is the solution space open? What are the relevant constraints? Is there a benchmark for a good solution, or is defining a benchmark part of the task? Are the relevant facts known or at least knowable, or must the decision be taken under uncertainty? Task construction is not just dictated by external task characteristics. Due to the severe limitations of logical reasoning, individuals often construct a problem as a decision under uncertainty when, in fact, it might be solved by formal logic (Oaksford and Chater, 1994). For instance, in situations of strategic interaction, people often do not engage in backward induction to determine their rational response to complex game trees, but simply ask: Is this person trustworthy? The fact that people can construct a given task in different, and often simpler ways makes it possible for them to rely on simple heuristics to make decisions or inferences (Payne *et al.*, 1993; Gigerenzer *et al.*, 1999).

Once the task has been construed, the decision-maker is left with three questions: Is it worthwhile to produce any output on the issue at hand? If so, what are the available options? Which of these options is to be preferred? Answering these three questions is what we call defining the solution. At this stage, the individual must define the output space. Often she is not confined to choosing among preconfigured options, but can use her creativity to generate new options. In assessing the options, she needs a normative benchmark, which again is not necessarily given or fixed. Often the individual is able to change the benchmark in light of emerging task characteristics (Klein, 1998).

Having made a decision to do something is not the same as actually doing it, which makes execution a separate element of the problem-solving cycle. There are a variety of internal implementation deficits (Gollwitzer and Schaal, 1998). If individuals delegate execution to technology or to other people, an implementation deficit may also result from technology failure, or from the fact that those entrusted with a task pursue their own agenda (cf. Winter, 1975; Mayntz, 1980 for the parallel question in political science).

The outcomes of a decision are not always evaluated when they have occurred. Negative evaluations reflect badly on the problem-solver and might reduce her social standing and/or self-esteem. In order to avoid this, individuals may even

3 It has been said, not without reason, that attention is not a resource like all others. After all, how can we choose optimally to attend to the issue that we should be attending to? But even these sceptics admit that attention is a scarce resource and that it must be allocated to some issues at the expense of others, Berger, *Economics and Philosophy* (1989). In every concrete instance, there may be too much context to allow a full calculation of how to best allocate this resource. But in a coarser way, the individual may be trained or determined not to overlook some features, or she may have been prodded by institutions to do so. This is all we are claiming here.

reconstruct the situation so as to reduce the appearance of a negative outcome. However, in order to learn from experiences, it is necessary that some evaluation takes place. In many contexts, the sensory system and memory do not give the individual much choice in the matter, by more or less automatically bringing previous bad experiences to mind when a similar task reoccurs. Moreover, evaluation can be entrusted to technology and to outsiders, if necessary even against the will of the individual, as happens when tax auditors are legally mandated to check the accounting practices of companies.

Explicit execution of all steps of the cycle for each and every problem in a given day would result in cognitive overload. This is avoided by using ready-made tools that automatically activate most, if not all, of the steps of the problem-solving cycle. Marketing research has demonstrated that consumers rely heavily on such 'ready-mades', for example in their purchasing behaviour (Olshavsky and Granbois, 1979; Laaksonen, 1994). The problem-solving cycle itself represents an idealized sequence of necessary processes, regardless of the way in which these processes are triggered and instantiated in actual decisions.

Problem-solving modes

In our framework, problem-solving modes link processing modules to task characteristics. Depending on the resources they muster, modules can meet different performance standards. Ideally, the problem-solving mode exactly matches the requirements of the task. Conversely, it is the variation in task characteristics that explains the multitude of problem-solving modes, which, in turn, allows individuals to reach better decisions. By not being confined to the single cognitively effortful all-purpose analytic tool suggested by the rational-economic model, human decision makers are able to economize on internal and external resources. This increases their overall problem-solving capacity.

Strictly speaking, these considerations are not sufficient to justify making problem-solving modes a separate component of our framework. It would be enough to link directly specific processing modules to task characteristics. Problem-solving modes are a necessary component, however, if the normal decision about how to decide does not directly match modules to task characteristics, but merely chooses among preconfigured problem-solving modes. This is precisely our claim. While novel problem-solving modes can be constructed on the spot, this probably does not happen very often. Instead, most people most of the time will select between existing, tried-and-true problem-solving modes for the present task and available resources, and employ the problem-solving mode that provides the best match.

The metaphor of the mental tool box is telling. When we want to hang a painting, we select a hammer and a nail. Only in extraordinary circumstances would we start to construct a new tool. Likewise, when facing a decision task, individuals typically employ the problem-solving modes available to them. Only in exceptional situations will they try to forge a new problem-solving mode.

When individuals decide how to decide, the default option is to select the most appropriate preconfigured problem-solving mode, given the characteristics of the task.

Relying on preconfigured problem-solving modes saves mental and external resources. The decision about how to decide reduces to a mere matching task, where the domain of the task at hand is matched against the domains in which existing problem-solving modes have performed well. Problem-solving modes can be classified as skills (Anderson, 2000: chapter 9). A skill is a chain of mental and physical modules that are chunked together. The skill is stored in memory as just one unit. If it is retrieved, it unrolls in its entirety. To a large extent, this is true of problem-solving modes.

Rather than being innate, problem-solving modes are learned and acquired with experience. As a result, not all individuals hold the same set of modes in their mental tool box. The contents of the tool box depend on an individual's problem-solving history. Professional deformation (Langerock, 1915) is an obvious illustration. A trained economist has a proclivity to see strategic interaction everywhere. This may induce her to use her game-theoretical reasoning skills for decision-making where others may rely on intuition. More importantly, to the extent that problem-solving modes are skills, an individual can learn how to make better decisions. Specifically, when our economist learns through evaluation and feedback that the performance of her chosen problem-solving mode was poor, she has one of two options. For one, she can switch to a different problem-solving mode in future instances, something she may do if she has learnt more about the proper domain of the problem-solving mode. Alternatively, she may modify the chosen problem-solving mode in some way to improve its performance in future applications.

No craftsman has an unlimited number of tools. Likewise, the number of problem-solving modes to which a given individual has access is probably limited, even though there is no specific bound on the number of problem-solving modes which human decision-makers may have at their disposal. When task characteristics change over time, or technological or institutional innovations provide new opportunities, human creativity will generate more appropriate problem-solving modes.

Table 2 illustrates the concept of a preconfigured problem-solving mode with its different stages by four examples from different content domains, described in the rows of the table. The examples range from utmost simplicity (responding to a fire alarm in a building) to high complexity (responding to a fire as a member of a fire brigade). The reaction to a fire alarm should be almost automatic. Selling land should be a deliberate affair. The other two examples of problem-solving modes combine deliberate with intuitive components. While the first two problem-solving modes do not involve evaluation, evaluation is crucial in the last two cases. The modes for responding to a fire alarm and for selling land are fairly fixed, while the modes for driving and for a fire brigade are highly plastic.

Table 2. Examples of problem-solving modes

Domain	Task Selection	Task Construction	Definition of Solution	Execution	Evaluation
fire alarm	override any other task	immediately leave the building	check emergency exit signs	go to staircase	–
selling land	do not multitask	legally standardized	see notary public	sign contract	–
defensive driving	do not answer the phone	safety first	adjust driving to weather conditions	manipulate car	permanently readjust to traffic situation
fire brigade	• save lives • fight fire	• extinguish • prevent from spreading	• water or foam? • access from within the building? • precautionary measures	coordinate action with members of brigade	permanently readjust

While the mode for selling land heavily relies on external resources, those are at most secondary in the reaction to a fire alarm, and in driving behaviour.

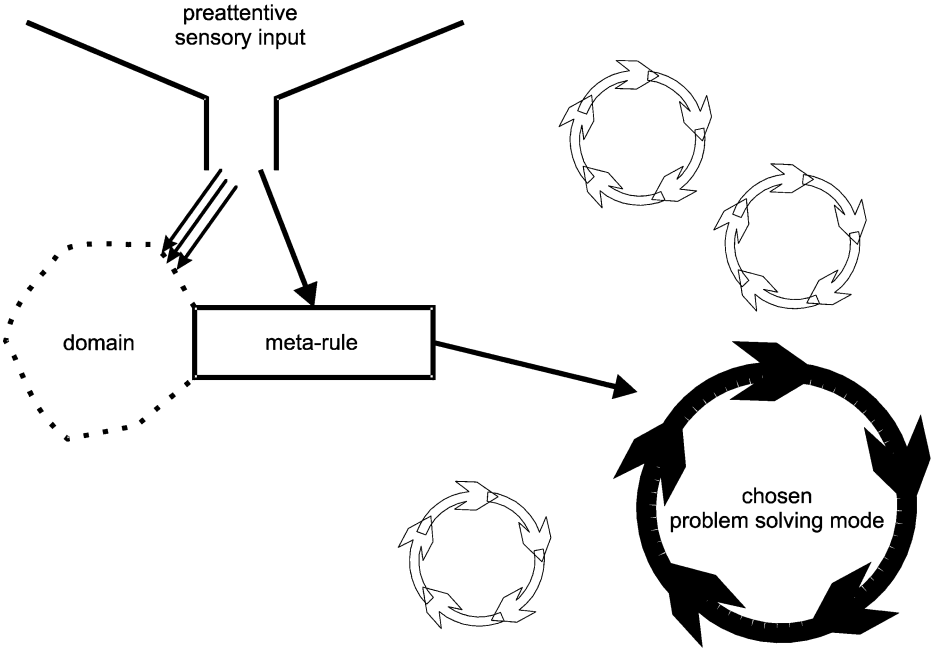
Choice among problem-solving modes

The multitude of problem-solving modes gives humans a rich set of options for solving problems, often with less effort than required by an exhaustive analysis; but this can also be seen as adding to the decision load, as resources must be invested into the meta-decision among problem-solving modes. It is not likely, however, that the brain goes through complex calculations for each of the many meta-decisions about how to decide that an individual takes every day. Instead, we hypothesize that the decision about how to decide is usually taken by default. If the individual has encountered similar problems before, she has a tendency to rely on the problem-solving mode that has proven satisfactory on earlier occasions.

Specifically we argue that the process of choosing a problem-solving mode is similar to heuristic decision-making, as analysed by Engel (2006). Figure 4 displays the hypothesized process, adapted to our problem of meta-choice.

Available information about the task and the environment is processed by an *ex-ante* defined decision rule that maps input conditions to problem-solving modes. Specifically, if the definitional cues specified for a problem-solving mode by the meta-rule are present, the corresponding mode is applied. When selecting a problem-solving mode, the decision-maker typically does not check whether the selected mode is in line with her goal system. This does not mean that goals are irrelevant, but that, in the concrete meta-choice, the checking of goals is incorporated into the matching exercise. Goals are implicit in the

Figure 4. Choice among preconfigured problem-solving modes



'domain' component. For a predetermined problem-solving mode to be applied, its definitional cues must be found in the input provided by the task environment, and the features of the situation must point to the applicability of the problem-solving mode. While the cues are definitional, the domain is described less precisely: The description could be by exemplars (Anderson, 2000: 350–352) or, more likely, by schemas (Bartlett, 1932: 199–204; Goldstein and Weber, 1997: 598) or scripts (Schank and Abelson, 1977).

For instance, before overtaking another car, a driver would check whether the traffic is ordinary. The schema for 'ordinary' traffic might encompass: Am I on the motorway? Are there two or more lanes? Can I look ahead more than 100 yards? Is there no rain or ice on the road? Is there little traffic? Do I know the street? Am I not tired? Not all, but a sufficient number of these questions would have to be answered in the positive. If they were, the two definitional cues would be: Is there traffic on the opposing lane? Are others overtaking at the same time? If both were answered in the negative, the driver would apply her 'overtaking routine', which determines all the necessary mental and motor activity.

Consequently, all the individual has to do when faced with a decision task is to check for descriptions of domains stored in memory. If a match is found, then the problem-solving mode is applied, without weighing the pros and cons of this or other problem-solving modes. Individuals only engage in such deliberation if they cannot locate an existing problem-solving mode for tackling the class of

tasks at hand. Such deliberation about the pros and cons of different modes may not be done consciously, and it may involve emotions.

5. Access points for institutions

The purpose of our framework has been to map out the access points for institutions. In principle, institutions may impinge upon the use of an internal or external resource, the selection of a specific version of different processing module(s), or of an entire problem-solving mode. Thereby, institutions may in principle have an impact on every element of the problem-solving cycle.

Illustrations from institutional practice

It is relatively easy for institutional designers to make additional external resources available for the problem-solving activities of their addressees. An equal opportunities audit is a case in point. Through such an audit, universities may discover that the proportion of female high school graduates is higher than the proportion of women who enrol at university, and that the proportion of women who achieve tenure is smaller than the proportion of women who get tenure track jobs. The institution thus provides statistical information in a situation where people's intuitive assessments might be faulty (Meadow and Sunstein, 2001). Institutions may also mandate the use of experts. For instance, house owners in some countries are not allowed to maintain their chimneys; they are required to hire a professional chimney sweep. Another graphic example is the 'super calculator' offered for download by the Australian Securities and Investment Commission.[4] It is meant to give consumers guidance in the complex choice of retirement plans, and in freeing them from negative consequences of emotional involvement when thinking about old age and premature death (cf. Laaksonen, 1994).

It is more difficult to enhance internal resources by outside intervention, but skill development is one way to do so. Regular fire drills, for example, are meant to inscribe a script in people's memories, which is expected to unroll relatively automatically in an emergency situation.

Other institutions provide their addressees with complete processing modules, as defined in Figure 1: for example the posting of standardized signs for emergency exits, another precautionary measure. In case of an emergency, individuals have no need to orient themselves but just follow the green signs.

Institutions may also have an impact on the module for output. For instance, safety legislation specifies that electric hedge shears have to be designed in such a way that they can only be handled with two hands, reducing the risk that the gardener will negligently injure herself or a bystander. Another piece of

4 www.fido.asic.gov.au/fido/fido.nsf/ef531319dbd6d282ca256afd001db469/fa4209304026a728ca257007001a6de3/$FILE/super_calc_v6.xls.

legislation makes long checklists mandatory in aircraft maintenance. Such lists make sure that all the safety relevant information is properly processed. Much of criminal law can be read as an attempt to influence the goal module. Individuals are threatened with severe sanctions if they let feelings like vengeance or avidity gain the upper hand. This is where most legal orders draw the line between manslaughter and murder. Finally, institutions may impose an evaluation and feedback module. This is, for instance, part of eco-management and audit schemes (EC OJ 2001 L 114/1).

Institutions can impact on all elements of the problem-solving cycle. The siren of the ambulance is a tool for changing other drivers' task selection. They no longer concentrate on reaching their destination, but drive to the shoulder. A good example of the impact of institutions on task construction is offered by waste management legislation. This legislation serves two purposes: to protect the environment from emissions on the waste path, and to reduce the use of natural resources. Both purposes are best served if products are designed in a waste friendly manner. Ideally, producers should address this in research and development. Legislation tries to bring this result about by obliging producers to take their products back at the end of the product cycle (Palmer and Walls, 1999).

There are two strategies institutional designers employ to change how their addressees define the solution to problems. The easier strategy aims at reducing the choice set. Take waste management again. Through advertising campaigns, environmental agencies have tried to establish the social norm 'do not litter'. Adding a normatively more desirable course of action to the individual's choice set is more demanding. But in some countries, waste management authorities have indeed educated households to separate waste into fractions, like paper or plastics (Ölander and Thogersen, 1995).

Institutions frequently have an impact on the execution of tasks. Again a negative strategy may be distinguished from a positive one. Internal sovereignty implies that government has a monopoly on the exercise of physical power. For ordinary citizens, this excludes a large set of technologies for carrying out their decisions. Conversely, fire fighters are trained to go into burning buildings (something others do at a much greater risk of life and limb). Finally, institutions may require evaluation processes. This is, for instance, done if the university president requires professors to post publicly student evaluations of courses.

Institutional designers do not just try to modify the resources or processing modules used for problem-solving or individual elements of the problem-solving cycle, but frequently attempt to endow their addressees with complete new problem-solving modes or to modify their choice among existing problem-solving modes.

Many institutions have a rationalizing effect, by shifting problem-solving to the use of modes that carefully and deliberately weigh pros and cons. Many have observed that markets have this effect (see only Becker, 1962; Plott,

1986). The most important effect of transferring interaction to a market is motivational. Acting on a market visibly raises stakes (Smith, 1989, 1991, 1994). Markets also shape motivations. A strong pro-social motivation is not likely to survive (Hoffman and Spitzer, 1985). But in markets, outright selfishness or even irrational anti-social behaviour does not pay either. Markets therefore also serve as training grounds for the basic rules of social interaction (Henrich and Boyd, 2005; Jankowiak, 2005). The cognitive effects of markets result from the fact that transactions occur in a formally or informally organized setting (Engel and Schweizer, 2002). The institutional framework thus helps market participants establish mutual expectations.

Other institutions have a routine-building effect. Professionalization does exactly this (Gehlen, 1960: 71; Goldstein and Hogarth, 1997: 29), with the legal barrier to market entry as its most important formal component. More and more professions have established such formal requirements. You can only become a doctor, a dispensing chemist, an architect, a structural engineer, an attorney, or a notary public after formal admission, which is preceded by formal training. Moreover, many professions are organized into chambers, which brings professional conduct under the supervision of a formally organized peer group (Battaglini, Benabou *et al.*, 2002). Both training and peer group control allow for a dense net of informal rules, dos and don'ts, and standards of best practice. Moreover, within professions, social status is closely linked to obedience to these rules, and to participation in their implementation.

Other institutions, such as a mandatory driving school, bring about automatization. Driving education is meant to endow future drivers with a whole set of very simple automatic behaviours. Stop when the traffic light turns red. Slow down when it starts to rain. Check the mirror before overtaking another car.

Implications for institutional design

While not all institutions are the result of explicit design, and social norms and customary law are typically not the result of purposeful intervention, many institutions are indeed introduced with a very specific goal in mind. How can an institutional designer make it more likely that the targeted decision maker will act in the intended way by changing how she decides to decide?[5] The answer to this question will depend on how much time the institutional designer has: Must she attain the ultimate goal by a single act of intervention, i.e. *ad hoc*? At this point, the policy relevance of our main claim becomes visible. Since problem-solving modes are typically preconfigured, *ad hoc* interventions will usually not be able to target directly a resource, a module, or an element from the problem-solving cycle. If intervention is, or must be, *ad hoc*, it is usually confined to targeting the choice among preconfigured problem-solving modes.

5 Actually, when they design marketing activities, firms have to reason along very similar lines, see, e.g., Earl and Wakeley, (2005: 94 and 120); Blackwell, Miniard and Engel (2006: chapter 3).

If the public is scandalized by a social problem, the media may demand that penalties be raised. This is a way of visibly raising stakes, which will have the effect of focusing self-critical attention on the decision-making process (Arkes, 1991). Higher stakes induce people to prepare more intensely (Tetlock, 1983a), to be more open to facts (Lerner *et al.*, 1998), to take more of the available information into account (Tetlock, 1983b; Tetlock and Boettger, 1989), to show greater internal consistency (Hagafors and Brehmer, 1983; Ashton, 1992), and to become more risk averse (Blatt, 1979). All these behavioural effects can be traced back to the fact that higher stakes make addressees switch to deliberate reasoning. A justification requirement has a similar effect. Cognitively, justification makes the individual aware of the actual complexity of the task (Cvetkovich, 1978; Hagafors and Brehmer, 1983; Weldon and Gargano, 1988). Motivationally, the justification requirement makes accountability salient (Hagafors and Brehmer, 1983) and typically also raises the stakes. If I conform to the pertinent social norm, I do not face much scrutiny. If I ostensibly deviate, however, I am forced to defend myself. I run the risk of social sanctions if the group does not consider my reasons compelling (Earl, 1983: 183).[6] A third option is forced choice. To that end, consumers may be legally required to seek multiple estimates before they sign a contract (Earl, 2005: 21), to seek expert advice before they become active (like mandatory vehicle inspection before buying a used car), or they may be required to wait out a cooling off period (Camerer *et al.*, 2003: 1238–1248; Earl, 2005: 22). That way, it might, for instance, be more difficult for the providers of funeral services to charge excessive prices, exploiting relatives' distress and social pressure to pay respect to the deceased. Making decisions more solemn is a related strategy. This is a venerable piece of wisdom, dating back to Keynes (1936). He recommended that, when buying shares, investors should treat this like marriage, much rather than like a market transaction. In appropriate circumstances, making a decision more costly can have the same effect. That way, counter-speculative devices like the Tobin tax (for a summary account see Tobin, 1996) may also be brought under this rubric.

Deliberate reasoning is not the only, and often perhaps not the best, problem-solving mode that can be triggered when immediate intervention is required. In experiments, psychologists often induce participants to use different decision modes by exerting time pressure (e.g. Maule *et al.*, 2000) or creating distractions through multitasking (e.g. Bishop, 2001). Institutional designers can learn from these examples, that it is possible to change the situation so that addressees match the task with another preconfigured problem-solving mode. In principle, research on consumer behaviour demonstrates that impulsive, emotional problem-solving

6 Methodologically, justification and social conformity are also ways to bridge the divide between rational choice and hermeneutics, Koppl and Whitman, Journal of Economic Behavior & Organization (2004).

is not particularly hard to trigger.[7] In a democratic country, for normative (and even constitutional) reasons, it might however be hard for policy-makers to defend the use of such tools for social betterment.

Immediate intervention can also exploit the fact that most problem-solving modes are skills. Skills are domain specific. Skills are stored in memory as procedural knowledge. This means that institutional designers can target recall from memory. The likelihood of recalling something from memory is determined by two factors: its base rate of activation, and how recent is the previous recall (Anderson, 2000: chapter 8). The latter can be influenced *ad hoc*. As research on priming demonstrates, previous activation of a fact or a skill makes its subsequent recall and use more likely. Previous activation does not need to target precisely the same item whose subsequent privileged recall is desired, as memory activation spreads in a network-like manner (Collins and Loftus, 1975). Shifting purchases from one context to another is one way in which institutional design may exploit this. If trade is over the counter, consumers will mainly rely on trust in the seller's recommendation. If trade is self-service, there will be more comparison shopping. However, shopping routines will matter more (cf. Earl, 2005: 20).

It is not always necessary that behaviour be changed *ad hoc*. It may be enough to change a long-term behavioural trend. This presupposes that society tolerates temporary deviations from the social optimum. Under these more favourable conditions, institutional designers may pursue one of two strategies. The more intrusive strategy aims at endowing addressees with additional problem-solving modes. The less intrusive strategy increases the availability of a previously existing problem-solving mode in a new area.

In the interest of reaching these long-term goals, interventions may be more or less direct. The most direct intervention is imposed training, such as the driving school requirement or the obligation to attend professional schools. A somewhat more complex strategy has been proposed for the renovation of houses. Homeowners are often lured into accepting offers that, were they to properly calculate expected values, would not be affordable. This happens since owners underestimate the risk of unexpected developments that make construction more expensive. It has been suggested that government publish graphic stories, to alert the public to the risk. Those sufficiently sensitive would then become the first to develop more appropriate, issue-specific routines. By observing their (comparative) success, others would gradually follow suit (Earl, 2005: 26). Along the same lines, over time patients could be endowed with a set of simple rules that help them decide when a health problem is severe enough that they had better see the doctor.

7 Sixty eight per cent of the items bought during major shopping trips, and 54% of those bought on smaller trips, are unplanned, *Wall Street Journal* (15 April 1999), A1, cited in Blackwell, Miniard and Engel (2006: 151).

Table 3. Institutional interventions

Domain	Shaping problem-solving mode	Triggering problem-solving mode	Maintaining acceptance
fire alarm	compulsory rehearsals	acoustic and optic symbols	justificatory stories
selling land	• compulsory rules of property law • notary public • land register	estate agent	(taken for granted)
defensive driving	driving school	• torts • limited insurance coverage	governmental impact on formation of social norms
fire brigade	• selection • professional training	• hierarchical organization • peer group	team spirit

An even more indirect strategy is applicable if the addressees have the desired problem-solving mode in their tool box, but do not employ it to a socially desirable degree. Problem-solving modes with a pronounced intuitive component are a practically important case, since perceived accountability induces individuals to work harder, but not necessarily smarter (Payne *et al.*, 1988: 200). As a result, the quality of decisions improves for standard tasks, but may deteriorate for unusual tasks (Pelham and Neter, 1995: 582; Hogarth *et al.*, 1997: 247–249). Decision makers become more likely to exhibit dominant responses (Lerner and Tetlock, 1999: 259) and focus on that at which they are good (Hogarth *et al.*, 1997: 247). In such a situation, institutions must help addressees establish trust in the power of their intuitions. To that end, institutions often shield addressees from the potentially negative consequences of their action. The business judgement rule from corporate law (Greenfield and Nilsson, 1997) is a case in point, as are rules that shelter public officials from personal responsibility, or rules that prohibit court intervention into marital affairs, and the parental education of children.

Going back to the examples from Table 2, Table 3 summarizes the access points and the most important elements of the respective institutional arrangements.

Conclusion

Our paper has attempted to make the following argument. In many contexts, institutional designers aim to control and modify the way in which addressees solve problems. Reaching this proximate goal is an indirect way of furthering the ultimate goal, i.e. socially more desirable behaviour. This is a demanding, but not impossible endeavour. Institutions have a number of access points available to them for this purpose. Specifically, institutional designers may pursue two different strategies. If *ad hoc* effects are desired, they may modify the task

environment in ways that trigger a different preconfigured problem-solving mode. On a longer-term basis, they may increase the repertoire of problem-solving modes available to addressees, and they may change the likelihood that specific problem-solving modes are used.

Our conceptual framework about how individuals solve problems is intended to show that institutions have a multitude of access points for the purpose. The effect of institutions is not confined to affecting resources, processing modules, or specific elements of the problem-solving cycle. We argue that institutional design is most effective if it targets the meta-selection of an entire problem-solving mode. Such changes can be effected by modifying the task environment in a way that makes the selection of a socially more desirable problem-solving mode more likely.

References

Anderson, J. R. (2000), *Learning and Memory. An Integrated Approach*, New York: Wiley.

Arkes, H. R. (1991), 'Costs and Benefits of Judgment Errors – Implications for Debiasing', *Psychological Bulletin*, **110**: 486–498.

Ashton, R. H. (1992), 'Effects of Justification and a Mechanical Aid on Judgment Performance', *Organizational Behavior and Human Decision Processes*, **52**: 292–306.

Ayres, C. E. (1944), *The Theory of Economic Progress*, Chapel Hill: The University of North Carolina Press.

Bandura, A. (1986), *Social Foundations of Thought and Action: A Social Cognitive Theory*, Englewood Cliffs, NJ: Prentice-Hall.

Bartlett, F. C. (1932), *Remembering. A Study in Experimental and Social Psychology*, Cambridge: Cambridge University Press.

Battaglini, M., R. Benabou, and J. Tirole (2002), *Self Control in Peer Groups*, http://papers.ssrn.com/paper.taf?abstract_id=298448.

Becker, G. S. (1962), 'Irrational Behaviour and Economic Theory', *Journal of Political Economy*, **70**: 1–13.

Berger, L. A. (1989), 'Economics and Hermeneutics', *Economics and Philosophy*, **5**: 209–233.

Bishop, K. (2001), 'Working Smart and Working Hard: The Effects of Entrepreneurial Multi-tasking and Intuitive Activities on Venture Performance', *Dissertation Abstracts International Section A: Humanities and Social Sciences*, **61**(9-A): 3645.

Blackwell, R. D., P. W. Miniard, and J. F. Engel (2006), *Consumer Behavior*, Mason, OH: Thomson South-Western.

Blatt, J. M. (1979), 'The Utility of Being Hanged on the Gallows', *Journal of Post Keynesian Economics*, **2**: 231–239.

Bohner, G. (2001), 'Attitudes', in Miles Hewstone and Wolfgang Stroebe (eds), *Introduction to Social Psychology*, Oxford: Blackwell, pp. 239–282.

Camerer, C. F., S. Issacharoff, G. Loewenstein, T. O'Donoghue, and M. Rabin (2003), 'Regulation for Conservatives: Behavioral Economics and the Case for "Asymmetric Paternalism"', *University of Pennsylvania Law Review*, **151**: 1211–1254.

Chaiken, S. and Y. Trope (1999), *Dual-process Theories in Social Psychology*, New York: Guilford Press.

Collins, A. M. and E. F. Loftus (1975), 'A Spreading-Activation Theory of Semantic Processing', *Psychological Review*, **82**: 407–428.
Corrado, M. L. (1999), 'Addiction and Responsibility: An Introduction', *Law and Philosophy*, **18**: 579–588.
Cvetkovich, G. (1978), 'Cognitive Accommodation, Language, and Social Responsibility', *Social Psychology*, **41**: 149–155.
Damasio, A. (2000), *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*, San Diego, CA: Harvest.
Dewey, J. (1922), *Human Nature and Conduct: An Introduction to Social Psychology*, New York: Holt.
Dewey, J. (1933), *How We Think*, Boston: Houghton Mifflin.
DiMaggio, P. J. (1998), 'The New Institutionalisms: Avenues of Collaboration', *Journal of Institutional and Theoretical Economics*, **154**: 696–705.
DiMaggio, P. J. and W. W. Powell (1991), 'Introduction', in Walter W. Powell and Paul J. DiMaggio (eds), *The New Institutionalism in Organizational Analysis*, Chicago: University of Chicago Press, pp. 1–38.
Dopfer, K., J. Foster and J. Potts (2004), 'Micro – Meso – Macro', *Journal of Evolutionary Economics*, **14**: 263–279.
Dworkin, G. (2005), *Paternalism* http://plato.stanford.edu/archives/win2005/entries/ paternalism/.
Earl, P. E. (1983), 'The Consumer in his/her Social Setting – a Subjectivist View', in Jack Wiseman (ed.), *Beyond Positive Economics?*, Houndmills: MacMillan, pp. 176–191.
Earl, P. E. (2005), *Behavioral Economics and the Economics of Regulation* http://eprint.uq.edu.au/archive/00003308/.
Earl, P. E. and T. Wakeley (2005), *Business Economics: A Contemporary Approach*, London: McGraw-Hill.
Engel, C. (2005), *Generating Predictability: Institutional Analysis and Institutional Design*, Cambridge: Cambridge University Press.
Engel, C. (2006), 'Social Dilemmas Revisited from a Heuristics Perspective', in Gerd Gigerenzer and Christoph Engel (eds), *Heuristics and the Law*, Cambridge, MA: MIT Press, pp. 61–85.
Engel, C. and U. Schweizer (2002), 'Organising and Designing Markets', *Journal of Institutional and Theoretical Economics*, **158**: 1–5.
Epstein, S. (1994), 'Integration of the Cognitive and the Psychodynamic Unconscious', *American Psychologist*, **49**: 709–724.
Evans, J. S. B. T. and D. E. Over (1997), 'Are People Rational? Yes, No, and Sometimes', *Psychologist*: 403–406.
Foster, J. F. (1981), 'Effect of Technology on Institutions', *Journal of Economic Issues*, **15**: 907–914.
Gehlen, A. (1960), 'Mensch und Institutionen', in Arnold Gehlen (ed.), *Anthropologische Forschung: Zur Selbstbegegnung und Selbstentdeckung des Menschen*, Hamburg: Rowohlt, pp. 69–77.
Gigerenzer G. and C. Engel (eds) (2006), *Heuristics and the Law*, Boston: MIT Press.
Gigerenzer G. and R. Selten (eds) (2001), *Bounded Rationality: The Adaptive Toolbox*, Cambridge, MA: MIT Press.
Gigerenzer, G., P. M. Todd, and ABC Research Group (1999), *Simple Heuristics that Make us Smart*, New York: Oxford University Press.

Goldstein, W. M. and R. M. Hogarth (1997), 'Judgment and Decision Research. Some Historical Context', in William M. Goldstein and Robin M. Hogarth (eds), *Research on Judgement and Decision Making*, Cambridge: Cambridge University Press, pp. 3–65.

Goldstein, W. M. and E. U. Weber (1997), 'Content and Discontent. Indications and Implications of Domain Specificity in Preferential Decision Making', in William M. Goldstein and Robin M. Hogarth (eds), *Research in Judgement and Decision Making*, Cambridge: Cambridge University Press, pp. 566–617.

Gollwitzer, P. M. and B. Schaal (1998), 'Metacognition in Action: The Importance of Implementation Intentions', *Personality and Social Psychology Review*, **2**: 124–136.

Greenfield, K. and J. E. Nilsson (1997), 'Gradgrind's Education: Using Dickens and Aristotle to Understand (and Replace?) the Business Judgement Rule', *Brooklyn Law Review*, **63**: 799–859.

Hagafors, R. and B. Brehmer (1983), 'Does Having to Justify one's Judgments Change the Nature of the Judgment Process?', *Organizational Behavior and Human Decision Processes*, **31**: 223–232.

Hall, P. and R. C. R. Taylor (1996), 'Political Science and the Three New Institutionalisms', *Political Studies*, **44**: 936–957.

Hanson, J. D. and D. A. Kysar (1999a), 'Taking Behavioralism Seriously: Some Evidence of Market Manipulation', *Harvard Law Review*, **112**: 1420–1572.

Hanson, J. D. and D. A. Kysar (1999b), 'Taking Behavioralism Seriously: The Problem of Market Manipulation', *New York University Law Review*, **74**: 630–749.

Henrich, J. and R. Boyd (2005), '"Economic Man" in Cross-Cultural Perspective: Behavioral Experiments in 15 Small-Scale Societies', *Behavioral and Brain Sciences*, **28**: 795–815.

Hodgson, G. M. (1988), *Economics and Institutions: A Manifesto for a Modern Institutional Economics*, Philadelphia: University of Pennsylvania Press.

Hodgson, G. M. (2004a), *The Evolution of Institutional Economics: Agency, Structure and Darwinism in American Institutionalism*, London: Routledge.

Hodgson, G. M. (2004b), 'Reclaiming Habit for Institutional Economics', *Journal of Economic Psychology*, **25**: 651–660.

Hodgson, G. M. (2006), 'What Are Institutions?', *Journal of Economic Issues*, **40**: 1–25.

Hoffman, E. and M. L. Spitzer (1985), 'Entitlements, Rights, and Fairness: An Experimental Examination of Subject's Concepts of Distributive Justice', *Journal of Legal Studies*, **14**: 259–297.

Hogarth, R. M., B. J. Gibbs, C. R. M. McKenzie, and M. A. Marquis (1997), 'Learning from Feedback. Exactingness and Incentives', in William M. Goldstein and Robin M. Hogarth (eds), *Research on Judgement and Decision Making*, Cambridge: Cambridge University Press, pp. 244–284.

James, W. (1893), *Psychology: Briefer Course*, New York: H. Holt.

Jankowiak, W. (2005), 'Market Integration, Cognitive Awareness, and the Expansion of Moral Empathy', *Behavioral and Brain Sciences*, **28**: 826–827.

Joas, H. (1993), *Pragmatism and Social Theory*, Chicago: University of Chicago Press.

Jolls, C. and C. R. Sunstein (2006), 'Debiasing Through Law', *Journal of Legal Studies*, **35**: 199–241.

Keynes, J. M. (1936), *The General Theory of Employment, Interest and Money*, New York: Harcourt Brace.

Klein, G. (1998), *Sources of Power: How People Make Decisions*, Cambridge, MA: MIT Press.

Knight, J. (1992), *Institutions and Social Conflict*, Cambridge: Cambridge University Press.
Koppl, R. and D. G. Whitman (2004), 'Rational-choice Hermeneutics', *Journal of Economic Behavior and Organization*, **55**: 295–317.
Laaksonen, P. (1994), *Consumer Involvement: Concepts and Research*, London and New York: Routledge.
Langerock, H. (1915), 'Professionalism: A Study in Professional Deformation', *American Journal of Sociology*, **21**: 30–44.
Lawson, T. (2003), *Reorienting Economics*, London: Routledge.
Lerner, J. S., J. H. Goldberg, and P. E. Tetlock (1998), 'Sober Second Thought: The Effects of Accountability, Anger, and Authoritarianism on Attributions of Responsibility', *Personality and Social Psychology Bulletin*, **24**: 563–574.
Lerner, J. S. and P. E. Tetlock (1999), 'Accounting for the Effects of Accountability', *Psychological Bulletin*, **125**: 255–275.
Loasby, B. J. (1976), *Choice, Complexity and Ignorance: An Enquiry into Economic Theory and the Practice of Decision-making*, Cambridge: Cambridge University Press.
Mantzavinos, C. (2001), *Individuals, Institutions, and Markets*, Cambridge: Cambridge University Press.
March, J. G. and C. Heath (1994), *A Primer on Decision Making: How Decisions Happen*, New York: Free Press.
Margolis, H. (1990), *Patterns, Thinking, and Cognition: A Theory of Judgment*, Chicago, IL: University of Chicago Press.
Maule, A. J., G. R. Hockey, and L. Bdzola (2000), 'Effects of Time-Pressure on Decision-making under Uncertainty: Changes in Affective States and Information Processing Strategy', *Acta Psychologica*, **104**: 283–301.
May, J. V. and A. B. Wildavsky (1978), *The Policy Cycle*, Beverly Hills: Sage.
Mayntz, R. (1980), *Implementation politischer Programme: Empirische Forschungsberichte*, Königstein/Ts.: Athenäum.
Meadow, W. and C. R. Sunstein (2001), 'Statistics, not Experts', *Duke Law Journal*, **51**: 629–646.
Nee, V. (1998), 'Sources of the New Institutionalism', in Mary C. Brinton and Victor Nee (eds), *The New Institutionalism in Sociology*, New York: Russell Sage Foundation, pp. 1–16.
North, D. C. (1990), *Institutions, Institutional Change, and Economic Performance*, Cambridge and New York: Cambridge University Press.
Oaksford, M. and N. Chater (1994), 'A Rational Analysis of the Selection Task as Optimal Data Selection', *Psychological Review*, **101**: 608–631.
Ölander, F. and J. Thogersen (1995), 'Understanding of Consumer Behaviour as a Prerequisite for Environmental Protection', *Journal of Consumer Policy*, **18**: 345–385.
Olshavsky, R. W. and D. H. Granbois (1979), 'Consumer Decision Making – Fact or Fiction?', *Journal of Consumer Research*, **6**: 93–100.
Ostrom, E. (2005), *Understanding Institutional Diversity*, Princeton: Princeton University Press.
Palmer, K. and M. Walls (1999), *Extended Producer Responsibility: An Economic Assessment of Alternative Policies*, www.rff.org/documents/RFF_DP-99-12.pdf
Payne, J. W., J. R. Bettman, and E. J. Johnson (1988), 'Adaptive Strategy Selection in Decision Making', *Journal of Experimental Psychology*, **14**: 534–552.
Payne, J. W., J. R. Bettman, and E. J. Johnson (1993), *The Adaptive Decision Maker*, Cambridge: Cambridge University Press.

Pelham, B. and E. Neter (1995), 'The Effect of Motivation on Judgment Depends on the Difficulty of the Judgment', *Journal of Personality and Social Psychology*, **68**: 581–594.

Peters, B. G. (1999), *Institutional Theory in Political Science: The New Institutionalism*, London: Pinter.

Plott, C. R. (1986), 'Rational Choice in Experimental Markets', in Robin M. Hogarth and Melvin W. Reder (eds), *Rational Choice: The Contrast between Economics and Psychology*, Chicago: University of Chicago Press, pp. 117–144.

Prelec, D. and R. J. Herrnstein (1991), 'Preferences or Principles: Alternative Guidelines for Choice', in Richard Zeckhauser (ed.), *Strategy and Choice*, Cambridge, MA: MIT Press, pp. 319–340.

Rutherford, M. (1994), *Institutions in Economics: The Old and the New Institutionalism*, Cambridge: Cambridge University Press.

Schank, R. C. and R. P. Abelson (1977), *Scripts, Plans, Goals, and Understanding: An Inquiry into Human Knowledge Structures*, Hillsdale: Erlbaum.

Simon, H. A. (1965), *The Shape of Automation for Men and Management*, New York: Harper & Row.

Simon, H. A. (1986), 'Decision Making and Problem Solving', in National Academy of Sciences (ed.), *Report of the Research Briefing Panel on Decision Making and Problem Solving*, Washington, DC: National Academy Press.

Simon, H. A. (1990), 'Invariants of Human Behavior', *Annual Review of Psychology*, **41**: 1–19.

Smith, V. L. (1989), 'Theory, Experiment and Economics', *Journal of Economic Perspectives*, **3**: 151–169.

Smith, V. L. (1991), 'Rational Choice: The Contrast between Economics and Psychology', *Journal of Political Economy*, **99**: 877–897.

Smith, V. L. (1994), 'Economics in the Laboratory', *Journal of Economic Perspectives*, **8**: 112–131.

Stanovich, K. E. and R. F. West (2000), 'Individual Differences in Reasoning: Implications for the Rationality Debate?', *Behavioral and Brain Sciences*, **23**: 645–665.

Strack, F. and R. Deutsch (2004), 'Reflective and Impulsive Determinants of Social Behaviour', *Personality and Social Psychology Review*, **8**: 220–247.

Tetlock, P. E. (1983a), 'Accountability and Complexity of Thought', *Journal of Personality and Social Psychology*, **45**: 74–83.

Tetlock, P. E. (1983b), 'Accountability and the Perseverance of First Impressions', *Social Psychology Quarterly*, **46**: 285–292.

Tetlock, P. E. and R. Boettger (1989), 'Accountability: A Social Magnifier of the Dilution Effect', *Journal of Personality and Social Psychology*, **57**: 388–398.

Tobin, J. (1996), 'Prologue', in Mahbub ul Haq, Inge Kaul, and Isabelle Grunberg (eds), *The Tobin Tax: Coping with Financial Volatility*, New York: Oxford University Press, pp. ix–xviii.

Tool, M. R. (1979), *The Discretionary Economy: A Normative Theory of Political Economy*, Santa Monica, CA: Goodyear Pub. Co.

Tool, M. R. and P. D. Bush (2003), *Institutional Analysis and Economic Policy*, Boston: Kluwer Academic Publishers.

Vanberg, V. (2002), 'Rational Choice vs. Program-Based Behavior: Alternative Theoretical Approaches and their Relevance for the Study of Institutions', *Rationality and Society*, **14**: 7–54.

Veblen, T. (1898), 'Why is Economics not an Evolutionary Science?', *Quarterly Journal of Economics*, **12**: 373–397.

Weber, E. U. (1998), 'From Shakespeare to Spielberg: Predicting Modes of Decision Making', Presidential Address, Annual Meeting of the Society for Judgement and Decision Making, Dallas, Texas.

Weber, E. U., D. R. Ames, and A.-R. Blais (2004), '"How Do I Choose Thee? Let me Count the Ways": A Textual Analysis of Similarities and Differences in Modes of Decision-making in China and the United States', *Management and Organization Review*, **1**: 87–118.

Weber, E. U. and C. K. Hsee (2000), 'Culture and Individual Decision Making', *Applied Psychology*, **49**: 32–61.

Weber, E. U. and P. G. Lindemann (2007), 'From Intuition to Analysis: Making Decisions with Your Head, Your Heart, or by the Book', in Helmuth Plessner, Claudia Betsch, and Tilmann Betsch (eds), *Intuition in Judgement and Decision Making*, Mahwah, NJ: Lawrence Erlenbaum.

Weldon, E. and G. M. Gargano (1988), 'Cognitive Loafing: The Effects of Accountability and Shared Responsibility on Cognitive Effort', *Personality and Social Psychology Bulletin*, **14**: 159–171.

Winter, G. (1975), *Das Vollzugsdefizit im Wasserrecht: Ein Beitrag zur Soziologie des Öffentlichen Rechts*, Berlin: Schmidt.

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