The naturalness of (many) social institutions: evolved cognition as their foundation

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Abstract: Most standard social science accounts only offer limited explanations of institutional design, i.e. why institutions have common features observed in many different human groups. Here we suggest that these features are best explained as the outcome of evolved human cognition, in such domains as mating, moral judgment and social exchange. As empirical illustrations, we show how this evolved psychology makes marriage systems, legal norms and commons management systems intuitively obvious and compelling, thereby ensuring their occurrence and cultural stability. We extend this to propose under what conditions institutions can become 'natural', compelling and legitimate, and outline probable paths for institutional change given human cognitive dispositions. Explaining institutions in terms of these exogenous factors also suggests that a general theory of institutions as such is neither necessary nor in fact possible. What are required are domain-specific accounts of institutional design in different domains of evolved cognition.

1. Introduction

General accounts of social institutions should provide plausible and testable answers to questions of institutional design, such as, why do social institutions have the specific features that we observe in human societies? Why do we observe common institutional features in otherwise very different cultural environments? Or, why do some institutions seem natural and compelling to participants, while others are considered alien or coercive? Here we develop the view that present institutional theories do not properly address such design questions, and that this can be remedied only by taking into account what we call the 'naturalness' of institutions, their connection to human expectations and preferences that result from evolution by natural selection. This perspective may help us understand

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commonalities across cultures, but also why some institutions are more successful and compelling than others and why they change in particular directions.

To some extent, this suggestion echoes a defining feature of the neo-institutional approach. From the beginning, neo-institutionalism has been oriented towards developing realistic models of the actors, countering the *Homo oeconomicus* model inherent in older institutional accounts and emphasizing the cognitive limits of human decision makers (Brousseau and Glachant, 2008). From this perspective, important lines of inquiry have been developed with regards to, first, how institutions carry a range of unintended consequences given the cognitive limits of their designers, and, second, how a function of institutions is to counter such limits (North, 1990). At the same time, however, this perspective of bounded rationality provides only a partial description of human cognition. While one line of research within the cognitive sciences has been preoccupied with the biased and fallible nature of human cognition, a complementary line of research has developed the view that human cognition is in fact 'better than rational' (Cosmides and Tooby, 1994). Evolutionary psychologists have argued that human cognition includes a multitude of domain-specific cognitive programs, each optimally geared (within evolutionary constraints) to solve particular problems in the course of human evolutionary history (Barkow *et al.*, 1992). The inferential power of these specialized programs comes from their content-rich nature. That is, they are loaded with inbuilt assumptions about their domain. Environments that fit these inbuilt assumptions appear intuitive and readily understandable.

Our aim is to outline the argument that institutions are effective not *despite* human cognition but, in part, *because* of human cognition. Essentially, we argue that the content-rich nature of evolved intuitions provides a foundation which can be and is often used in the design of many social institutions. Institutions that fit these intuitions, we propose, develop more easily, require less effort to conform to and are more culturally stable.

While evolutionary psychology is increasingly incorporated into social theory (Hodgson, 1999; Alford and Hibbing, 2004; McDermott, 2006; Petersen, 2010), and some economists have been keen to integrate an evolutionary logic into their models (Dopfer, 2005), many social scientists may be unfamiliar with the approach. By way of developing our account, we therefore present a series of illustrations of how our knowledge of human evolution and cognition provides the tools for a causal, naturalistic understanding of social institutions such as marriage rules and norms, legal systems and social exchange mechanisms. In each instance, our point of departure will be the existence of specific cross-cultural features in the design of these institutions and how these can be seen as the institutionalization of evolved intuitions. From this, we show how these insights can inform the study of institutions

and develop a range of novel predictions on how institutions develop and change.

2. Explaining common features

We focus here on named social institutions, that is, sets of norms and rules about which all culturally competent members of a group have explicit, accessible mental representations. For instance, *soccer* in England, *marriage* in the USA, *potlatch* among the Tlingit or *meeting* for Quakers is a social institution of the kind we consider here. The important point here is that people have some notion that, for example, there is such a thing as *potlatch* in their social environment and they have some notion of how observed behaviors can be seen as exemplars of these abstract notions, or violations of their rules (Searle, 1995). These named bundles of concepts, norms and behaviors are what we call 'institutions' in the rest of this article (Ostrom, 2005). This is only a subset of 'institutions' in the neo-institutional sense, some of which remain implicit, such as, for example, a sense of fairness or simple habits.

Institutional models generally emphasize the contribution of both *formal* and *informal* aspects of such institutions, the former including laws, contracts, administrative rules and procedures, while the latter include implicit norms and routines. Here we want to explore the cognitive processes that underpin both aspects of institutions. An institution such as 'marriage' in the USA combines legal norms and emotional preferences, contracts and moral intuitions; in short, both formal and informal aspects. The question for us is, what makes certain 'packages' of informal and formal norms natural and compelling to participants?

In many domains fairly similar institutions can be found in diverse cultural environments. For instance, despite obvious differences, many human groups know of interaction norms that (seemingly) correspond to what an English speaker would call 'marriage' (we will discuss, presently, whether that similarity is an illusion). An interesting fact is that such diverse institutions share not just very general properties, for example, conditions and limits of sexual relationships and parenting, but also many other features, for example, the association between long-term sexual intimacy and economic solidarity, the fact that the union is in principle exclusive, the fact that its inception requires public ceremonies, etc. These are common features, most of which may not be universal, but all of which are so widespread that this recurrence requires an explanation.

In the social sciences, different frameworks suggest very different ways of considering institutions and their common features. For instance, a culturalist account is the default position of much anthropological reflection on institutions. In this view, the latter are the way they are because they are congruent with the particular concepts, values, norms, etc. widespread in a particular place (Gudeman, 1986). A recurrent problem of anthropological culturalism is, of course, the presence of recurrent features of social institutions, which in a purely

localist framework would have to constitute massively improbable coincidences. This is true for marriage but also for the emergence of similar patterns in, for example, commons management, sports or political structures. To a large extent, classical functionalist accounts are fraught with similar problems. They require that most institutions emerge as solutions to particular classes of problems or situations, and survive to the extent that they fulfill that role in congruence with other institutions. However, again, this has proved insufficient to account for the recurrence of particular institutions (e.g., raising children in families) compared with other, possibly efficient alternatives (e.g., raising children in kibbutz-like communities) (Merton, 1996).

A more promising account of institutions appeared in economics with the development of neo-institutional models. These extended the notion of institution to encompass both formal and informal, tacit or explicit 'rules of the game' that constrain interaction between economic agents (North, 1990). These rules decrease transaction costs, information costs in particular. Within the neo-institutional tradition there are different accounts of how institutions are created. There is not the space to review such models in detail; for such surveys, see Knight and Sened (1995), North (2005) and Brousseau and Glachant (2008). Briefly, *conventional* accounts assume that institutions emerge out of the recurrent features of repeated economic interactions – they are simply regularities turned into rules (Sugden, 1986). *Competitive* accounts suggest that institutions develop out of original, small-scale norms by conferring competitive advantages to newcomers who participate in the new arrangement (Greif, 2006). Finally, *bargaining* models emphasize power asymmetries between parties in the creation or modifications of institutions (Knight, 1995). However, none of these accounts points to easy, natural answers to questions of design. Whether specific institutions are shaped by bargaining or convention is not sufficient to account for highly specific features, such as, for example, the link between intention and responsibility in the law, or the connection between economic sharing and sex in marriage norms.

Here we present a complement to neo-institutional accounts. Institutions comprise rules or norms that most agents obey, expect most others to obey and expect most others to expect them to obey (Bicchieri, 2006). But, for a rule or a norm to become an institution it must be widely distributed in the minds of the members in a group (Sperber, 1996). In order to explain how institutions are developed and changed, we therefore need to understand how people adopt, modify and transmit rules and norms (Heintz, 2007). Most importantly, we need to understand which types of rules and norms are particularly likely to be transmitted and adopted without much modification, while others require significant effort, skill and special knowledge.

This leads to our main contention, that institutions are best understood against the background of a set of human psychological dispositions that influence the effort needed to adopt and accept certain social arrangements. To introduce

this cognitive account of institutions, we illustrate how our evolved psychology makes an impact on the developments of common features in three different domains of institutional design.

3. Illustration (I). Marriage norms and mating strategies

Institutional framework

In most societies, there is a distinction between occasional or informal sexual encounters and arrangements (which may be approved, tolerated, frowned upon, prohibited, etc.) and more stable and formalized unions. The initiation of the latter kind of union is generally, at least in principle, marked by some public event. There are shared norms about what each party should expect from the other, given such ceremonies, and about how they should behave towards third parties. Finally, sanctions are associated with the violation of these norms. Why is all this so common?

A standard, and plausible initial answer would be that such norms reduce uncertainty in social interaction, a general feature of social institutions. Marriage norms and wedding ceremonies certainly have that effect, in several ways. First, marriage between two individuals conveys to third parties that the individuals concerned have rights in each other that (*mutatis mutandis* the local norms) are not available to other members of the group. There is, for example, a certain amount of resources or help that a husband may expect from a wife or vice versa, or a woman from her in-laws, but not from others. Second, marriage conveys to third parties that the individuals concerned have (again, with local variations) withdrawn from the pool of potential mates. The fact that there is a long-term stable union between the partners modifies third parties' mating strategies and preferences towards either one of the partners. Ceremonies do not just signal this to a large number of people, but also inform them all at the same time in the same way. Third, marriage conveys to each party that the other is (at least overtly) committed to fulfilling their obligations as per the local norms. Regardless of intentions, the public commitment signal creates expectations against which either party can measure behaviors.

In other words, the most important effects of weddings seem to consist in signaling. In all human societies weddings are of interest and great concern to outsiders, which is why for instance the ceremonies are often quite literally very noisy affairs (Van Gennep, 1909). Internal signals between the married parties are equally important. The potential benefits of an efficient marriage are in part public goods, and in many cases cannot be achieved without sacrifices, given the spouses' divergent preferences (Posner, 2000). So marriage requires honest, hard-to-fake signals of commitment. These are provided in many societies by costly conditions for marriage, for example, the obligation for brides to leave their kin groups, for grooms to provide bride wealth, or to show adequate means

to support a family, etc. Such conditions serve (in part) as signals, which may explain why, when they are relaxed as happened in many Western societies, they are replaced with informal signals such as occasional gifts (Posner, 2000). The occurrence of informal, 'spontaneous' signals varies inversely with the precision of the group-wide representation of marriage roles.

All this is fine, but falls short of a satisfactory answer to questions of design. Coordination and uncertainty-reduction effects do not explain why marriage is universally about two parties, so that polygamy is a series of two-party contracts, not a group arrangement; why polygyny is common and polyandry exceedingly rare; why a single institution binds sexual, economic and offspring-related norms in most societies; why divorce is often available but fixed-term marriage is generally not; and other such common features.

Evolutionary background

The institutions may make more sense in the context of specific preferences and competences that arise from human evolution. Obviously, natural selection results in particular mating preferences and processes in each species, and ours can be no exception (Symons, 1979). It would be surprising if human competences and preferences in this domain had no influence on the design of marriage. Indeed, human reproduction and parenting display expected features given the specific history of our primate lineage (Van Schaik and Van Hooff, 1983).

As in most other mammals, there is in humans a large asymmetry of reproductive costs between human males and females. The latter's costs include a long gestation, an even longer nurturing period, with their associated energy and opportunity costs, as compared with the lesser cost incurred by males. This, as in comparable species, means that sexual selection has been important in favoring distinct behaviors and preferences in males and females. Females need to be much more choosy than males in mate selection. Also, females should prefer males with demonstrable capacity and willingness to nurture their offspring. Differences between male and female preferences result in an equilibrium that includes relatively long-term paternal investment in children's nurturing, conditional on fathers' certainty that the children are their own biological offspring, as well as a certain but limited amount of philandering and 'mate poaching' in both sexes.

These evolutionary factors predict a whole variety of human behaviors which are actually observed in most human societies, such as: the general disposition towards long-term paternal investment; sexual differences in attractiveness criteria (Buss, 1989); differences between criteria for long- and short-term mates (Kaplan and Gangestad, 2005); the ways in which attractiveness is turned off by childhood cohabitation and other cues, leading to incest avoidance (Lieberman *et al.*, 2003); the specific triggers of and gender differences in sexual and romantic jealousy (Buss, 2000); mechanisms of sexual coercion and attempts by men to control women's sexuality and increase paternal certainty (Wilson and Daly,

1998); the general pattern of serial exclusive monogamy (and polygyny) observed in human societies (Van Schaik and Van Hooff, 1983); the male tendency to reject step-children (Daly and Wilson, 1988; Anderson *et al.*, 1999a, 1999b); the influence of male presence/absence on young women's choices of reproductive strategies (Ellis, 1993); and many other behaviors.

Naturally, most computations required by such behaviors are largely unconscious – only their results are available to conscious inspection. To cite but one example, it seems that women's choice of early sexual activity and early pregnancy are directly affected by paternal presence during a critical period in early childhood (Ellis *et al.*, 2003). This can be explained as learning from the environment which reproductive strategy is most appropriate, given low paternal investment in offspring (Quinlan, 2003). Obviously, young women never represent reproductive choices as a search for optimal fitness. They are responding to such proxies as the attractiveness of particular mates or a desire for children, and other here-and-now preferences for particular kinds of behaviors, all of which are the outcome of non-conscious cognitive processes.

An integrated perspective

An important point here is that human preferences and behaviors in the mating domain include the expectation of stable long-term unions between men and women that associate privileged or exclusive sexual access with economic solidarity. Note that this is largely intuitive, that is, most humans hold this expectation without necessarily having the explicit model or principles that would explain it. Also, this expectation is of course more abstract than the norms for such long-term unions in particular societies, which can vary in many respects such as number of people involved (polygyny *versus* monogamy), exclusiveness (e.g., societies with sanctioned 'visiting' lovers), required paternal investment in offspring (from full responsibility to occasional visits) and, most important, filiation and inheritance rules.

All this suggests that human beings are equipped with an evolved, domain-specific learning system that is prepared for and attentive to information about the particular ways in which marriage unions are locally defined and organized. In this perspective, the transmission of culturally specific information about marriage norms 'free-rides' on information supplied by our intuitive expectations. That is, people easily acquire their local marriage norms because the assumptions (e.g., that the union is heterosexual, that it is about long-term mating, that it associates sexual access with resource sharing, etc.) are among the evolved cognitive equipment of the species.

This would explain why many aspects of marriage norms are not the object of explicit, deliberate transmission, seem to 'go without saying' while others are the object of explicit norms. For instance, the assumption that marriage binds a man and a woman is intuitive enough that it is not actually specified in most cultures. By contrast, the permissible number of simultaneous unions, or the precise

manner in which they can be broken up, are matters of explicitly transmitted information. The expectations that married people will contribute to each other's welfare, or that an officially declared union must be officially dissolved, do not have to be made explicit. In this perspective, the social institution seems to consist in particular parameter settings of a marriage template that is spontaneously created by normally developing minds.

4. Illustration (II). Criminal law and moral intuitions

Institutions

The emergence of 'the law' as a separate domain of norms and behaviors, distinct from other social norms, is confined to large polities with literacy (Maine, 1963; Goody, 1986). However, most human groups do have explicit norms for conflict resolution and the punishment of wrongs, even if these are not defined as different from ordinary, non-legal decision making (Hoebel, 1964). From these norms and procedures to the literate, codified legal systems of large states, there is a continuum of social complexification, along which some central aspects of legal norms are preserved. Legal systems all modify personal, face-to-face conflict resolution on the basis of norms that are: (a) explicit; (b) (at least partly) de-contextualized (e.g., construed as the right way to sanction theft, rather than this particular act of theft); (c) (at least partly) impersonal, as they in principle apply to whole classes of agents or even to all possible agents; and (d) therefore more predictable than informal ones.

Why these common features? One possible explanation is that legal institutions are just economically efficient sets of conventions. Richard Posner, for instance, considers that standard economic models of utility maximization explain most features of legal systems (Posner, 1981). Economic rationality would account for differences between the custom-bound legal systems of small-scale traditional societies, and the legal codes of large-scale industrial polities. For instance, the former generally maintain strict (no-fault) liability, so that one (or one's kin group) is responsible for whatever damage one has caused, whether or not one is guilty of a wrong or of negligence. This, as Richard Posner argues, makes sense in economic systems where the cost of information is particularly high, so that long inquiries into circumstances and intentions would be problematic. In the same way, the fact that litigants are generally asked to pay for arbitrage, in other words to hire a judge, makes sense as there is no institution for the public provision of magistrates (Posner, 1981).

Economic efficiency can certainly account for specific differences between the legal norms of various places, but it seems insufficient to explain the common features of these systems and the ways in which people generally find them compelling (Cosmides and Tooby, 2006). This is particularly clear in the domain of criminal justice, where apparently obvious features of institutional

arrangements are based on complex intuitive assumptions about behavior, intentions and fairness.

Relevant cognitive systems

In the last 20 years, convergent findings in developmental psychology, behavioral economics and cross-cultural psychology have suggested that human beings in very different groups evaluate the moral valence of actions on the basis of largely tacit, emotion-laden common intuitions (Haidt, 2007). Intuitive morality is independent from (and only partly affected by) explicit, culturally specific understandings of and teachings about right and wrong (Greene, 2005). Intuitive morality also underpins a sense of fairness that is quite distinct from economic rationality (McCabe and Smith, 2001). Rather than survey these models and findings, we will only mention those points directly relevant to the issue of criminal behavior and appropriate punishment.

Human minds in a variety of cultural environments develop the following specific intuitive processes. First, there is a domain of moral principles and norms, distinct from other evaluative dimensions of action. Indeed, even preschool children have definite intuitions about the difference between moral rules and mere social conventions (Turiel, 1994). Second, the judgment that a behavior is permissible, commendable or wrong occurs as a fast, automatic consequence of representing the specific action and context. These intuitions may then be explicated, nuanced or (more rarely) reversed by explicit reasoning, but the latter is quite literally an afterthought – deliberate, slow and often produced in order to justify a pre-existing intuition (Haidt, 2001). Third, intuitive moral appraisals are generally accompanied by congruent emotions. Emotional appraisal is part of the processes leading to moral evaluation, which is why experimental manipulations of the emotion can trigger significant changes in moral judgment (Haidt, 2001). All this is particularly visible in young children's moral development. In contrast to the classical, Kantian picture of children gradually building moral understandings by acquiring more complex modes of reasoning (Kohlberg, 1981), experimental evidence suggests that moral development consists in the calibration of prior intuitions (Turiel, 2002).

Experimental evidence also shows that people are intuitively convinced that wrong behaviors vary in seriousness – that much is assumed by young children even for completely novel behaviors (Turiel, 2002). Another common intuition is that the punishment should fit the crime, as it were – such that a schedule of graded punishments is required (Nichols and Knobe, 2007). Again, these thoughts are not entertained as the result of deliberate reasoning on moral matters, but as the intuitions that start the process of moral reasoning.

Another important aspect of moral intuitions is a motivation to punish norm violators, even in third parties who are not harmed by the transgression. This preference is not based on learning from trial and error, since the potential

consequences of either punitive or non-punitive strategies are manifest only in the long run. Such punitive attitudes are universal in human groups and virtually non-existent in other animals. There are various interpretations for this evolutionary novelty. Punitive sentiments may have helped recruitment to collective action (Yamagishi, 1992). They may also signal cooperative attitudes, as those who punish transgressors are signaling their attachment to local norms and their willingness to incur costs in their defense (Fessler, 2001), which would explain why people tend to be more punitive when observed by others (Kurzban *et al.*, 2007). Finally, punitive attitudes may be an attempt to eliminate the fitness advantage enjoyed by free-riders (Price *et al.*, 2002) or recalibrate their motivations (Petersen *et al.*, 2010). What is certain is that the motivation for third-party punishment is general in human groups, and strong enough to override the cost involved.

An integrated perspective

In the same way as for marriage, evolved psychological capacities and processes constrain legal norms. They provide a set of understandings that need not be explicitly transmitted as a condition for participation, and therefore make institutions 'learnable' to the extent that they are congruent to intuitive understandings (Cosmides and Tooby, 2006). Legal institutions do not require that one learn concepts of right and wrong, the need for appropriate sanctions, or that one acquire the motivation for third-party punishment. Also, the ways in which legal institutions publicize decision making seems to derive from moral intuitions. As we noted, people have definite intuitions about the role of reputation in cooperation. It may be no surprise that legal institutions turn reasoning and decision making, ordinarily private mental events, into publicly scrutable processes. Courts work in the open, laws are inscribed in stone or in books, and penalties are made visible, for instance, by using stigma as a salient form of punishment (Kurzban and Leary, 2001; Posner, 2007). All these aspects of the law seem self-evident to most practitioners, as indeed they should be if they are based on common pre-existing intuitions.

In return, institutions do modify social interactions in the legal domain. Obviously, the existence of public representations of norms and processes makes punishment more predictable and the domain of lawful behavior more easily delineated, which translates as an advantage in transaction costs (Posner, 1981). But the effects may be even deeper, as most people tend to reify or essentialize the law as independent from actual people's decisions and the workings of their minds. To the extent that the motivations for particular judgments seem both stable and impersonal, they reinforce this tacit form of legal idealism, a notion that laws are not made but discovered, which itself may make them more compelling.

5. Illustration (III). Commons and exchange intuitions

The cognitive framework may also make sense of some common features of particular economic institutions. Consider, for instance, Elinor Ostrom's description of the principles that allow efficient management of common-pool resources such as fisheries, water distribution, etc., in which a resource must be pooled and might be depleted by opportunistic unregulated use (Ostrom, 1990). According to Ostrom, the following principles are necessary, though not sufficient, to preserve the semi-formal institutions that manage commons: (1) some rules must clearly define the set of agents authorized to use the commons, the conditions for entry; (2) the rules must be adapted to the specific nature of the resource; (3) the rules must be designed by the users; (4) rule observance must be monitored by the users or agents accountable to the users; and (5) rule violation must be sanctioned by graded punishment (Ostrom, 1990).

Why are commons institutions the way they are, and why these recurrent features? An institutional account does not directly address them, as it is focused on different issues, both theoretical (showing how efficient commons-management systems emerge despite collective action problems) and pragmatic (deriving recommendations for efficient commons management). All the rules mentioned above require a complex background of psychological processes and preferences. For one thing, commons management implies definite judgments about distributive justice, about which divisions of resources count as acceptable, given different agents' contributions or needs (Fehr *et al.*, 2006). Psychologists have shown that such judgments are mostly based on early developed intuitions (Enright, 1984). Young children in very diverse cultures use similar principles of distributive justice, combining a principle of equality (equal shares as the best distribution) with context-based intuitions about merit and need (Sigelman and Waitzman, 1991). Obviously, these early judgments are then calibrated during development as a function of local forms of exchange. But the underlying principles subsist. They result in specific fairness intuitions that cannot be explained in terms of standard rational choice models (Fehr *et al.*, 2006).

The cognitive mechanisms required for commons management also include the capacity and motivation to identify violators of agreed norms. Experimental findings suggest that people are specifically sensitive to cheating (taking benefits without paying costs in a social contract) and quickly identify which behaviors constitute cheating. The underlying cognitive system is domain specific, in the sense that social contract violations are not processed in the same way as violations of social norms in general, or exceptions to other kinds of rules (Cosmides and Tooby, 2005).

As Ostrom and others have demonstrated, efficient use of commons requires a whole lot of specific 'tools' (institutions in the neo-institutional framework) such as rules, norms and models to overcome collective action problems. However, these tools need not be provided by the institutions themselves. To a large extent,

norms and rules 'free-ride' on competencies and motivations for fair exchange that are part of our evolved cognitive equipment.

6. What are evolved domain-specific systems?

Evolved systems as specialized learning and decision mechanisms

The perspective developed in relation to these three examples highlights how institutional designs are directly facilitated by the structure of human cognition. In this way, they complement the focus of previous accounts of the interplay between cognition and institutions. In the extant literature the focus has been on the general cognitive limitations of human cognition and how the latter affect the workings of institutions. One strand of argument has been preoccupied with how the fallibility of institutional designs can be traced back to the fallibility of the cognitive capabilities of their designers (Pierson, 2004). Another strand of research has focused on how institutions can buffer the limits of human cognition (Knight and North, 1997). Hence, institutions – refined through trial and error – provide external constraints on behavior which simplify individual choice and guide it toward rational outcomes. A third strand of research has focused less on the limits of fixed cognitive processes but rather argued for the plasticity of cognitive processes and how they are moulded by the institutional environment of the individual (Dequech, 2006). While these avenues toward integrating insights on human cognition and institutions are highly important, they are based on an incomplete description of the current state of knowledge in cognitive science.

In our view, the content (and not just the limits) of a variety of special and species-typical cognitive systems, as observed by evolutionary anthropologists and psychologists, is relevant to issues of institutional design and maintenance. As we noted above, human beings have an intuitive mating psychology that includes attractiveness judgments, relationship maintenance and reproductive strategies (Symons, 1979; Buss, 1989). They have specialized social exchange mechanisms for cheater- and cooperator-detection (Cosmides and Tooby, 2005) and a highly specific moral psychology (Haidt, 2007). They also have a coalitional psychology which monitors the establishment and maintenance of groups with common interests, vigilance towards defection, rivalry towards other groups, etc. (Kurzban *et al.*, 2005), as well as systems that monitor ethnic cohesion and attitudes towards others (Schaller, 2006) or gender relations (Wilson and Daly, 1992; Sidanius and Veniegas, 2000). In fact, sketching the range of evolved cognitive mechanisms underlying common human behaviors would be far beyond the scope of this article (for general surveys, see Buss, 2005; Dunbar *et al.*, 2005).

Several features of these cognitive systems are of particular relevance here:

1. *Cognitive systems are domain specific.* Cognitive predispositions are not just general constraints, for example, on the amount of material that can be acquired, on the capacity of attention and memory. Cognitive predispositions also consist in domain-specific expectations about the kinds of objects and agents to be found in the world. Only some items of information trigger operation of a specific system, in much the same way as only molecules of a particular shape and composition trigger the activity of specific enzymes (Barrett, 2005b). Many such narrow input–output relationships are species-typical fixations rather than plastic features that can be moulded by environmental processes (Tooby & Cosmides, 1992).

2. *Each domain-specific system includes its own decision-making procedures.* In most standard models of economists and political scientists, one assumes that people's behavior is guided by a domain-general, utility-maximizing cognitive system. In those cases in which human behavior does not conform to normative models, this is said to result from general limitations of the decision-making system, for instance because of biases (Kahneman *et al.*, 1982) or impulsiveness (Ainslie, 2005; Loewenstein and O'Donoghue, 2005). These putative flaws in decision making are thought to be domain general – they would occur in the same way in, say, keeping friends and keeping lovers, avoiding enemies and avoiding pathogens. However, psychological evidence suggests a different picture, in which each domain-specific system (e.g., concerned with retaining mates, or with recruiting coalitional allies) comes with its own, domain-appropriate decision rules. For instance, if you are dealing with a contractor for house repairs, it may make sense to average the benefits and costs from previous interactions with that specific agent, in order to compute their overall value to you. If dealing with a lover, it would seem intuitively odd to balance cases of infidelity with cases of availability. Even when we use rules of thumb or 'fast and frugal heuristics', these are tailored to the kinds of problems we evolved to encounter (Gigerenzer and Todd, 1999; Gigerenzer, 2002).

3. *Competencies and preferences are integrated.* This is a consequence of the previous point. Each domain-specific cognitive system includes its own decision-making procedures which combine specific preferences and specific competencies. There is no reason to consider that preferences are external to decision-making systems. For instance, consider human coalitional psychology, our capacity to form an alliance with genetically unrelated agents, usually against other groups. It includes as part of a single package both a set of preferences (e.g., a strong aversion for other agents' defection, a desire to make the coalition stronger, a willingness to pay a high price of entry, etc.) and a set of competences (e.g., the monitoring skills to detect other agents' commitment, the signaling skills to express one's solidarity, etc.).

4. *Cognitive systems are learning mechanisms.* Each domain-specific system is specialized in picking up particular kinds of information in the organism's environment. Contrary to widespread assumptions outside evolutionary biology, 'acquired information' and 'genetically specified information' are not a zero-sum system. On the contrary, organisms that can acquire vast amounts of information from their environments (e.g., primates) need vastly more specified initial systems than organisms (e.g., invertebrates) that acquire less. Between species, more learning invariably means more 'instinct', so to speak. Humans have a complex coalitional psychology and a complex mating psychology, which means that in both domains they acquire enormous amounts of information from their social and natural environments precisely because sophisticated learning systems in these domains are specified by their genotypes.

Implications for interaction with environments

These features have a number of implications for the operations of human cognition which are highly important to institutional researchers. Here we focus on two implications. We begin by outlining them in relative broad terms, review some of the evidence for these implications in the cognitive science literature and then specifically apply them to institutional analysis.

1. *Cognitive systems operate more reliably in matching environments.* Cognitive systems are designed to operate within a specific domain and, therefore, the inbuilt assumptions, categories, competences and learning procedures reflect the evolutionarily recurrent structure of that exact domain. When cognitive systems are applied to problems on the fringes of their proper domain, they will operate less automatically and less reliably.

This has been directly shown in cognitive research. For example, we have evolved to hunt prey and protect ourselves against predators and, therefore, most probably have specialized cognitive systems designed to track the movements of animals, their orientation, and their most likely trajectory (Barrett, 2005a). In modern societies, predatory animals constitute less a threat than, for example, cars but this does not mean that we can effortlessly apply the systems designed for tracking the former to the latter. And, in fact, Joshua New *et al.* showed that subjects are far slower to recognize changes in car orientation than the orientation of animals – even when these animals are visually unfamiliar, unimportant, and barely discernible animals (New *et al.*, 2007).

Similarly, we detect violations on rules faster and more reliably when detecting violations corresponds to detecting cheaters on social exchanges (Ermer *et al.*, 2007). As argued above, rule violation in the context of social exchange is the exact domain of a set of highly specialized cognitive systems while, most likely, generic rule violations are not. This insight is also directly applicable to actual design situations. Human–computer interfaces require much less effort on behalf of the user if these interfaces correspond to the structure of cognitive systems designed for handling real-world objects (Nørager, 2009).

2. *The structure of cognitive systems creates a baseline motivation to shape environments into a format that matches them.* Because environments that fit our cognitive systems can be processed effortlessly (given the possibility for reliably applying evolved categories, competences, etc.), people will find matching environments more 'natural' and their exigencies more compelling. Also, creating and upholding non-matching environments require a level of effort that individuals could be unwilling to pay without special incentives.

Again, a number of studies in cognitive science have directly demonstrated this. Most of these studies have focused on an extreme version of the above principle, in the sense that these studies have shown that we simply process and react toward non-matching environments as if they were matching. In the domain of popular culture, one obvious example is pornography that is psychologically represented as if mating opportunities were present, thereby triggering sexual arousal, etc. (Saad and Gill, 2000). Similarly, research shows that people have difficulties in distinguishing between their real friends and people they see on television in the sense that their satisfaction with their friendships is influenced by both (Kanazawa, 2002). These cognitive effects also occur in the direct interaction with others. For example, modern individuals process the anonymous one-shot interactions of mass society (an evolutionary novel phenomenon) as if they were of the iterated kind to which we have most probably adapted (Price *et al.*, 2002; Hagen and Hammerstein, 2006).

7. Predictions concerning institutional design

One may object that this is fine but insufficient. The evolutionary–cognitive model may solve some issues of design, telling us what rules are 'natural', easy to acquire and intuitively compelling for human beings. But, the objection goes, it does not address the major question of institutional development, i.e. why are these cognitive tools and motivations activated in some but not all contexts? Why, as a result, are some commons successful and others less so? Since the cognitive tools are always present, why are they not always used?

Institutions are a part of the external environment of individual actors and, hence, are processed with the same cognitive effects as other parts of the environment. The application of the above insights to institutional analysis is, therefore, straightforward. Doing so should enable researchers to build specific predictions about (a) which institutions or aspects of institutions people are more likely to find 'natural', (b) to what extent people can have an intuitive grasp of the actual workings of their institutions, and (c) how institutional participation can recruit motivations that are there anyway, regardless of the institutional environment.

In essence, we suggest that the structure of evolved cognitive systems and dispositions create a cognitive 'rubber cage' (Gellner, 1985). That is, human understandings are usually constructed and therefore constrained by the structure

of long-evolved cognitive systems, and remain inside the cage, as it were. It is not impossible to think beyond our intuitive assumptions or to build institutions that violate them. However, each such extension requires some effort, and the further one moves away from intuitive expectations, preferences and understandings, the more effort is required (Boyer, 1998; Sperber, 1996). The further away one moves from our evolved understandings, (a) the more effort will be required to get them adopted by large numbers of people, (b) the less people will intuitively grasp how the institution works, and (c) the less motivated they may be to participate.

Because divergence from the intuitive set of design features requires effort, such divergence will be less common than convergence (at least, absent other strong environmental pressures for divergence). Of course, this is likely to be a matter of degree. For instance, it is not too difficult for some human groups to extend the scope of marriage-like institutions to, say, encompass homosexual unions. A more radical departure from common intuitions would be to envisage fixed-term marriage contracts or simultaneous polyandric unions. Although such arrangements are not unthinkable or impossible, they are less likely than standard marriage-like systems in human societies, given the intuitive assumptions that normal human minds spontaneously develop about the connections between sex, reproduction and subsistence. Within this approach, it is also possible to specify a number of other specific predictions:

1. *People will prefer intuitive to non-intuitive institutions.* Intuitive institutions, quite simply, seem more natural and appropriate to people. For people to prefer a non-intuitive solution to a problem that mimics something which our cognitive architecture was designed to solve, effort is required on their behalf and they need good reasons to put in this extra effort.

Some research has specifically shown this in the domain of punishment institutions. As argued above, punishment has most probably played a key role for evolution of human social life. Recent studies in neuroscience demonstrate that brain regions related to the production of pleasure are activated when subjects engage in the punishment of free-riders (De Quervain *et al.*, 2004). Also, economic experiments have demonstrated that people prefer to tackle collective actions problems in institutional contexts that allow for punishment (Gürerk *et al.*, 2006). We can observe such effects outside the laboratory as well. Throughout the 20th century criminal justice institutions have shifted from punishing to helping the offender (Garland, 1990). Politically, this shift was legitimized by references to criminologists and other experts' observations that punishment did not work to reduce crime in large societies. In this way, criminal justice institutions were pulled away from their intuitive function – to impose costs on anti-social individuals (Petersen *et al.*, 2010) – and instead designed to simply decrease recidivism in a non-moralizing manner. Across countries, however, these attempts have now been significantly reversed and an explicit

part of this has been public reactions led by, for example, victim movements. When they reverted to more punitive practices, policy makers often made clear that the reversal aimed at placating public sentiment rather than decreasing crime (Balvig, 2005). In our terms, the return to punitive rhetoric and practices made the institution closer to our evolved intuitions.

This example also illustrates another point: that intuitiveness is especially important for institutions that are directed toward the public. Worries about rehabilitation-oriented systems did not come from within the penal system itself, whose personnel were quite willing to invest the needed effort to think outside their intuitions. Rather, the pressure came from the general public who have much else on their minds than investing cognitive effort in overwriting their punishment intuitions (Roberts *et al.*, 2002).

2. *More intuitive institutions are more efficient in influencing behavior.* This follows from our argument that intuitive institutions are easier to process. It is important to notice that this is not just because it is easier to learn some kind of institutional rules than others but rather because intuitive institutional rules simply require less learning on behalf of the subjects. For instance, criminal justice practices that rely on evolved concepts of right and wrong influence public behavior, we suggest, not because citizens have uploaded legal knowledge in their minds but precisely because evolved expectations spare them that effort. While laymen, for example, do not know the specific punishments for shoplifting *versus* grievous assault, their behavior can be guided by an intuitive understanding that the latter is more serious than the first (Robinson *et al.*, 2007).

An example from the health sector serves to illustrate this. To avoid poisoning of children, a government-funded health program in the USA encouraged parents to mark poisonous materials with a 'Mr. Yuk' sticker, an emoticon with the facial expression of disgust, to signal that the material should not be ingested. The effectiveness of this program was negligible (Demorest *et al.*, 2004). One factor is that accidental poisoning does not fall within the evolved domain of disgust but rather within the domain of fear – i.e., hazard management. Adults as well as children react to accidental poisoning with fear rather than disgust (Pooley and Fiddick, 2010). Marking poisonous material with disgust-conveying emoticons does not engage the cognitive machinery for producing the very behavior that the institution aims at activating.

Our claim here, it must be stressed, is not that 'natural' institutions are necessarily more efficient in terms of generating optimal outcomes. Efficiency is here strictly understood with reference to their power to influence behavior and not whether the resulting behavior is optimal or rational. In fact, given that our evolved cognitive systems evolved in ancestral environments, institutions that seem 'natural' to the human mind might often be ill-suited to solve the problems of modern-day mass society (see also Carvalho & Koyama, 2010).

3. *More intuitive institutions seem more legitimate.* In the domain of social and moral interaction, institutions that promote our welfare in an intuitive way (i.e., by promoting behavior that would have been ancestrally beneficial and sanctioning behavior that would have been ancestrally costly to us) would be, all else being equal, perceived as more legitimate. As classical sociologists have emphasized, legitimacy is at the root of effective governance (Tyler, 2001). If rules are perceived as legitimate, individuals will spontaneously incorporate them into their decisions. Importantly, efficiency in influencing behavior is not necessarily the same as efficiency in solving the problem that the institution is designed for. Our cognitive systems are designed to function within evolutionarily recurrent situations and can be ill suited for solving the problems of large societies. Similarly, there is no guarantee that institutions matching these intuitions are good at solving modern problems.

Evidence concerning the management of common-pool resources can be interpreted along these lines. In the relation to common-pool resources, the problem is congestion and, hence, people need to be restrained in their use of the resources. Detailed studies have shown that the institutions that facilitate restraint most effectively are institutions that facilitate face-to-face interaction among the participants (Ostrom, 1990). This allows for a social situation that mimics that kind of situation in which we have evolved to deal with such problems of collective actions. In fact, laboratory experiments show that resources are protected by institutions that emerge as a result of between-participant social interaction, better than by externally enforced institutions, even if the latter yield the optimal use of the resource (Cardenas *et al.*, 2002). The reason is that people do not feel intrinsically committed to the optimal-but-enforced institutions and, therefore, cheat on them whenever possible.

Clearly, then, the efficiency of institutions in regulating behavior is not a matter of their inherent rationality. Rather, it is the extent to which they allow for appropriate cognitive machinery to become activated. In the case of collective action, a number of studies document that the human mind contains sophisticated machinery for committing ourselves to pro-social decisions but that these are extremely sensitive to the extent to which *others* are similarly committed (given selection pressures for making cooperation reciprocal) (Frank, 1988). Coordination of commitment is possible when institutions for common-pool resources are endogenously agreed upon rather than exogenously enforced.

Another illustration of the importance of 'naturalness' for the regulatory potential of institutions is provided by a series of studies of when people accept specific distributions of costs and benefits (Hibbing and Alford, 2004; Smith *et al.*, 2007). People's reactions are modulated, not just by whether or not they benefit from the allocation, but also by the way the institutions orchestrating the allocation matches evolved moral sentiments. Using the Ultimatum Game, Hibbing and Alford, for example, experimentally varied the institutions governing who would be assigned the role of proposer and, hence, be

allowed to divide a pot of money between themselves and the other participant – the receiver – who could accept the division or decline (in which case neither participant received any money). Receivers readily accepted (and felt satisfied with) highly unequal divisions (against their interest), if the institutions governing the allocation of roles focused on merit or chance but not if these institutions focused on preferences, that is, granted a participant the power to propose because he/she wanted this role most (Hibbing and Alford, 2004). We have evolved cognitive devices to resist exploitation (Buss and Duntley, 2008), which is why we spontaneously suspect the motives of eager dictators – and, of particular relevance here, feel more dissatisfied with institutions that allow them to move into power.

4. *Non-intuitive institutions will drift towards greater intuitiveness.* Non-intuitive institutions require subjects to continuously invest effort to ensure that their rules are correctly recalled. For example, studies in social psychology demonstrate that individuals use effortful cognitive operations to encode and recall expectation-inconsistent information when forming impressions of others (Macrae *et al.*, 1999). By implication, we expect that popular images and understandings of the rules of non-intuitive institutions will drift towards greater intuitiveness; that is, over time (if countervailing actions are not taken) subjects will be more likely to recall intuition-confirming parts of institutions and mould initially intuition-disconfirming rules into a format that matches intuitions.

One example of this comes from religious institutions and, in particular, Max Weber's classical account of the rise of capitalism (Weber, 2002). Before the reformation, Christians could secure salvation by submitting themselves to the authority of the Catholic Church. After the reformation, this possibility was closed and, instead, the dominant theological paradigm described how certain people were predestined to become saved. With predestination, the normal response to a problem as psychologically significant as the prospect of eternal damnation, i.e. action, was effectively removed. As a result, at the popular level, the theological institution of predestination quickly drifted into the more intuitive informal institution of looking for signs for salvation in the form of success in the current life. Through success and, hence, hard work, one could then 'reveal' oneself as chosen for salvation.

Divergence between non-intuitive official doctrine and public practice and belief is also widespread in the realm of politics (Kuran, 1995). In the literature on political tolerance, for example, it is often noted that people strongly endorse official doctrines about widespread civil rights for everyone, and at the same time display strong intolerance towards specific groups (McClosky and Brill, 2003). In the domain of criminal justice, there is widespread support for the principle of proportionality, i.e., that punishments should 'fit' the crime (Darley and Pittman, 2003), enshrined in modern criminal justice institutions but at the same time people, when considering specific criminals, allow for a number of exceptions

to these principles. While such public beliefs do not necessarily reshape official institutions, they nonetheless influence how the institutions in fact work. As these last examples show, a cognitive science account of institutions does not preclude the possibility that institutions are also shaped by environmental factors that can make them divert from natural focal points. Rather, the point is that such divergence will constantly be put under pressure by processes of institutional drift towards greater fit with our evolved cognitive systems.

8. Is a general theory of institutions possible (or desirable)?

The framework proposed here implies a substantial departure from common assumptions in theories of institutional design. Neo-institutional models, for instance, describe domain-general processes that should in principle apply in similar ways to marriage, exchange or criminal law, or most other domains of institutional norms (Ostrom, 2005). Also, the aim of such models is to provide general economic or political factors that constrain institutional development. By contrast, we have argued that one should explain institutions in terms of domain-specific psychological systems. Human psychology comes with assumptions, capacities and preferences concerning, for example, reproduction and parenting, distinct and separate from those concerning the punishment of wrongdoing or the establishment of reliable exchange relations. These are exogenous factors in the sense that they stem from the evolved cognitive make-up of the species, independently of social institutions.

If this is a valid proposal, then a general theory of institutions as such is not really what social scientists should aim for. That is because a general model, based solely on endogenous factors, should be extremely abstract to be equally applicable to the many disparate domains of institutional development. At such a level of abstraction the model may not predict or exclude anything in particular, and therefore not be of great value. An account of institutional design and development is more likely to come from integrated, probably situation-specific, models that bring together economic constraints and human-specific competencies in particular domains of social interaction.

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