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Comment

Studying institutions in the context of natural selection: limits or opportunities?

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Abstract: In this comment, we respond to comments raised by Eastwood (2010) in response to our article on the role of evolutionary psychology in understanding institutions (Boyer and Petersen, 2011). We discuss how evolutionary psychological models account for cultural variation and change in institutions, how sociological institutionalism and evolutionary models can inform each other, how evolutionary psychological models illuminate the role of power in institutional design and the possibility of a 'general theory' of institutions.

We are grateful to Jonathan Eastwood for his thoughtful discussion (Eastwood, 2012) of our argument concerning the 'naturalness' of institutions (Boyer and Petersen, 2011). We are particularly encouraged by the fact that he focuses on potential benefits and limitations of the evolutionary perspective in terms of empirical value, in a most welcome contrast to the metaphysical tenor of many 'paradigmatic' disputes. In this reply, we mostly focus on clarification of our proposal, accepting like Eastwood that in the end only empirical studies can reveal the potential benefits or limitations of particular perspectives. Roughly, we consider that our original proposal is far closer to Eastwood's own views than may appear at first sight, and we suggest conceptual clarifications to evolutionary accounts.

A note on terminology: In our original contribution and Eastwood's comments, the term 'evolutionary' denotes an approach to institutions and other social processes that give pride of place to the fact that human social and cognitive capacities are the outcome of evolution by natural selection, which altered the frequency of specific genotypes in human population. This must be distinguished from 'evolutionary' approaches that focus on the dynamics of change in institutions, suggesting in particular that some institutional forms may

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persist because they out-compete others in a form of Darwinian competition (Hodgson, 1999). Such approaches are certainly compatible with the perspective discussed here; indeed, they may be part of an integrated approach to institutions. It is just unfortunate that the same term applies to these distinct lines of research.

1. Is evolution relevant only to universals or to 'boundary conditions'?

At various points in his article, Eastwood raises the question, whether an evolutionary perspective is of any explanatory depth, given the great cultural differences in some institutions. So, for instance, 'there is [. . .] variation in how marriage and families are structured such that one cannot possibly reduce it all to humanity's shared cognitive architecture' [page 5 of Eastwood MS]; Or, Q4 'given the diversity of actual legal institutions [. . .] what evolutionary psychology can explain about legal systems is quite limited' [page 7 of Eastwood MS]; and Eastwood reiterates this point at various places in his comment.

This argument rests on the assumption that human evolved cognitive architecture results in uniform behaviors. The assumption is in our view as unwarranted as it is familiar in the social sciences. One should be clear about this point as it is crucially important in the study of historically specific social institutions. We would argue that evolutionary explanations (1) are in no way contradicted by the existence of cultural or historical differences, and in fact (2) in many cases provide the best explanation of these differences.

First, let us discuss the question of universals. Although a cultural universal may suggest, *prima facie*, that some human evolved trait is involved, the converse inference, that cultural differences rule our evolved traits, is not sound. Far from being a problem for evolutionary explanations, variable context-dependent decisions are precisely what one should expect as an outcome of evolution (Cosmides and Tooby, 1994, 1995). To see this, one can use the analogy of mathematical equations to understand evolved traits. As with an equation of the form $y = ax + b$, many universal evolved traits are constant at the mechanistic level rather than the level of outcomes and, hence, reliably matches specific but different outcomes (y) to specific and different inputs (x). More specifically, the complexity of the adaptive problems facing our ancestors implied that the choice of adaptive strategies depended on a range of environmental contingencies. Natural selection is predicted to have sculpted our cognitive architectures to track such contingencies and regulate behavior on the basis of them (Tooby and Cosmides, 1992).

A recent example comes from a study on cultural differences in shame-proneness. It is commonly argued that many Asian countries have 'cultures of shame' with a range of institutionalized rituals for accepting and cleansing shame, while the emotion of shame plays a much lesser role in Western countries such as the United States. According to Sznycer and colleagues, the feeling of shame reflects the operations of an adaptation designed to mitigate spread

of reputation-damaging information (Sznycer *et al.*, 2012). Such reputation management is far more critical when one is enmeshed in social networks that are difficult to replace and, by consequence, the cognitive systems producing shame should be designed by natural selection to increase or decrease such feelings as a function of the 'replaceability' of a person's social relations. In this way, cultural differences in shame institutions, practices and rituals could, in part, reflect facultative responses of evolved traits to ecological variations in so-called relational mobility (Yamagishi and Yamagishi, 1994). The evidence supports this prediction of Sznycer and colleagues. Cross-national differences in shame-proneness between, on the one hand, Japan and, on the other hand, the United Kingdom and United States, are partly mediated by cross-national differences in perceptions of relational mobility (Sznycer *et al.*, 2012).

Another example – related to the evolved psychology of cooperation that we mentioned in our original article – is that of cross-national differences in welfare institutions. There are massive, well-known differences in welfare spending across the Western world. Scandinavian countries spend much more on this than other, especially Anglo-American countries. A range of recent studies have provided ample evidence that these differences do not reflect any deeper psychological differences in, for example, compassionate tendencies between Scandinavians and Americans (Petersen, 2012; Petersen *et al.*, 2012). Rather, the different sentiments towards welfare recipients reflect calibrations of the same evolved psychology of reciprocal cooperation to local conditions. Much of the difference in social spending can be explained by variation in ethnic homogeneity (Alesina and Glaeser, 2004). In the homogenous Scandinavian context, almost all citizens including welfare recipients are drawn from the same ethnic in-group and, hence, are psychologically represented as individuals engaged in the same system of reciprocity. As expected, this up-regulates cooperative motivations. In contrast, in the fractionalized United States, where different ethnic and racial groups are tacitly construed as rival coalitions (Kurzban *et al.*, 2001), there is little Q5
motivation for the majority to support welfare recipients who are believed to be primarily drawn from minorities (Alesina and Glaeser, 2004; Gilens, 1999); for further discussion, see Petersen *et al.* (2012). The factor driving these different intuitions and institutions of welfare is not a vague, question-begging set of 'cultural values' but a psychology of cooperation that monitors the local ecology, computes the likelihood of reciprocation from potential targets of cooperative behaviors, and regulates cooperative motivation on this basis.

These cases serve to illustrate how environmental contingencies and evolved traits interact in producing culturally varying intuitions which subsequently can inform and create differences in actual institutions. Our own contribution was perhaps misleading in this respect, as we did emphasize historically improbable similarities between institutions (e.g. marriage) in different times and places. This does not mean that cultural variation cannot be explained or accounted for by evolutionary psychological approaches. This is in particular important with

regard to the commentary's argument that moral intuitions differ across time and space (e.g. page 7 of Eastwood MS). This is to be expected from an evolutionary approach. At the level of manifest culture (or institutions), variation is not a problem from an evolutionary psychological approach.

This, of course, adds a whole additional layer of complexity in understanding how evolved intuitions constrain institutions: first, we should describe the evolved psychological mechanisms operating in the relevant domain, their input conditions and so forth; second, we should analyze the input available in the specific ecology under investigation; third, we should bring together these parts to make predictions about the kinds of intuitions that would arise from the interaction between ecological cues and evolved information-processing systems. These predictions should then provide a basis for thinking about how evolved intuitions would constrain sets of institutions in the specific ecology under investigation.

On the basis of this interpretation of variation, we think that evolutionary perspectives will contribute much more than 'boundary conditions' on institutional design, as Eastwood suggested [page 15 of Eastwood MS]. Obviously, the notion of boundary conditions is ambiguous. At a sufficient level of generality, any explanatory theory can be said to provide boundary conditions for more specific phenomena, so this would of course apply to evolutionary models and local behaviors. But Eastwood suggests something more important, namely, that evolutionary models would specify values (e.g. the minimal and maximal numbers of people that can carry out collective action) between which variation is *not* explained in evolutionary terms. As the above examples illustrate, we expect that evolved psychology will account for *both* such boundary conditions *and* for local variations between them.

2. Institutions, evolution and change

The above arguments obviously suggest that, in our view, an evolutionary perspective is particularly important in explaining institutional change, a point we emphasized in the second part of our article.

To take a well-researched example, consider how homicide rates vary a lot between places, for example between Mexico and Canada. Given these numerical differences, together with salient differences in values (e.g. a 'culture of honor' in some places but not others), could evolutionary psychology tell us anything substantial as concerns who kills whom and in what circumstances? As a first step, evolutionary models would predict that violent conflict should involve men more than women and that it would focus overwhelmingly on fitness-related resources, notably social status and access to women. That is indeed the case, regardless of the different cultural values and models of what violence is legitimate. As a second step, the evolutionary perspective implies that homicide, far from being the outlet of irrepressible aggressive 'urges', would be the outcome

of a complex decision-making process that balances the costs and benefits of various courses of action and triggers motivation for the optimal one. This evolved decision-making procedure would be designed to be sensitive to variation in the costs of these courses of action. Indeed, psychological research suggests that the systems involved reliably estimate the frequency of homicide cases in the agent's social environment, the likelihood and cost of punishment, but also the potential costs of non-violence, for example sending signals of vulnerability, summing all these values to modulate the agent's motivation to violence (Daly and Wilson, 1998; Wilson and Daly, 1992).

The evolutionary perspective in this domain does not just accommodate local and historical differences. It actually provides coherent and testable explanatory models for these differences. For instance, in places where people are highly vulnerable to attack and theft, for example in many pastoral economies, the model predicts that people will intuitively perceive the relevance of 'honor' values and institutions, which provide them with deterrence. By contrast, in places with efficient conflict-resolution and punishment institutions, people will tend to find such honor norms ridiculous or even pathological. These predictions seem to account for differences, for example between the American South and the Mid-West, that would otherwise be seen as the outcome of contingent variation in cultural values and norms (Nisbett and Cohen, 1996).

Such evolutionary psychological models could account not just for geographical variation but also for temporal variation in institutions and, hence, for institutional change. Petersen *et al.* (2010) describe this in relation to the evolution of institutions in the domain of criminal justice. In small-scale societies, perpetrators generally have strong ties to most members of the social group, making reparative strategies potentially effective. In large-scale societies, in contrast, social ties and possibilities of social control are in general weaker. Also, concentrations of resources in large-scale societies make punitive agents more powerful and, hence, less vulnerable to retaliation. This might partly explain the rise of ruthless punitive systems after the emergence of agriculture (Spierenburg, 1984), which spurred rapid growth in population sizes and concentrations of power. Importantly, however, this institutional trajectory only held until the 17th century, and for the last 300 years, criminal justice in the Western world has steadily grown milder (Garland, 1990). Again, this turn could be explained as an interaction between a universal cognitive architecture designed to produce intuitions about punishment and changes in historical contingencies as emphasized in the described models. Specifically, at least two developments since the 17th century seem to foster intuitions that would put a greater premium on reparative strategies. First, the rise of the print press and subsequently, newspapers, photography, television and film could cause lay people's experiences in industrial societies to more closely mimic the greater engagement found among individuals in smaller scale societies (because of the more direct psychophysical representations of fellow citizens). In particular,

the distribution of information made possible by the print press seems to have played an important role in establishing a sense of collective identity in large-scale societies (Anderson, 1983). Second, these processes might have been fuelled by the institutional developments of the capitalist market economy and later welfare state institutions. As also argued in classical Durkheimian theory, capitalist society breeds more inclusive coalitional identities as extensive labor divisions facilitate experiences of successful social exchange with people highly dissimilar from oneself. Similarly, the establishment of social welfare schemes in the 20th century has facilitated more equal levels of living standards, clothing and appearances, which helps reinforce and sustain the mental representation of the nation state as a shared coalition (Larsen, 2006). In line with this, research shows that punitiveness is lower in economically developed countries (Mayhew and van Kesteren, 2002) and in countries with large welfare states (Christie, 2004).

These remarks serve as simple illustrations of how theories of universal cognitive architecture can be used to explain processes of institutional change. Because evolution designed our psychology to produce changing intuitions with changing ecological conditions, any effect of intuitions on institutions will naturally result in institutional changes as conditions change.

3. Alternative explanations: sociological institutionalism

In our original article, we emphasize how improbably similar certain institutions are cross-culturally. Eastwood raises the point that approaches other than evolutionary ones could account for such non-trivial common properties of institutions, including their similarity and some non-functional features. In particular, Eastwood emphasizes sociological institutionalism with special reference to DiMaggio and Powell (1983). These authors make a strong theoretical case that, for example, mimicking from institutional role models and other types of learning effects can explain the diffusion of certain institutional designs.

We certainly acknowledge the role of informational transmissions as a key ingredient in processes of institutional design. Seldom does a group invent institutions *de novo*. Indeed, evolutionary psychologists have written at length about the evolutionary origins and cultural role of the kinds of learning biases that DiMaggio and Powell discuss, such as adopting the practice of the successful (DiMaggio and Powell, 1983; see also Richerson and Boyd, 2006). What we do, however, contend (and mention in the original article) is that one must focus equally on the origins of the institutional design (where did the idea come from?) and the stability of the design once implemented. Wherever an idea for a specific design comes from, the fit with the cognitive mechanisms in minds of the designers and those subject to the institution would be vital in ensuring the continued and reliable reproduction of the institution.

As an illustration, consider the similar patterns found in organizations as diverse as businesses and armies. Military personnel on deployment are typically assembled in small units of about 15–25 individuals, who spend considerable time together and can perform as one coordinated agent in highly complex interactions. Beyond these small units, military personnel readily put their lives on the line for members of larger units, typically of a few hundred individuals (Goette *et al.*, 2006). This double layer of organization is found in armies the world over. Interestingly, a similar pattern is found in many businesses, with small coherent work units and larger networks of trust. The same pattern is observed in political parties, academic cliques or high-school groups (Kurzban *et al.*, 2005). Now this pattern, clearly, is not a straightforward consequence of the (very diverse) nature of the tasks to accomplish in these settings, or of the equally diverse cultural norms evoked in these contexts. It is likely that there is informational transmission involved and perhaps even that, for example, businesses explicitly mimic real combat units. Yet, a more general explanation that can explain the continued appeal of this form of organization and the fact that experimental studies show that people *spontaneously* form such networks *inside* organizations (Charness *et al.*, 2007) may lie in human evolved capacities for cooperation. As Robin Dunbar and others have pointed out, the size of human and other primate groups is limited by our capacities for recording other agents' behavior and gauging their commitment to collective action (Dunbar, 2003). We cannot keep track of the individual goals of more than a dozen people, so in contexts where tracking goals is crucial (e.g. high danger), we prefer such small units. We cannot keep information about who is for or against whom for more than a few hundred, which is why cliques and networks get to that size. This would predict that total commitment in life-threatening contexts cannot extend beyond a few dozen individuals, while high-trust relationships are difficult to maintain above about 200 agents (Dunbar, 1996).

More generally, we expect that many recurrent features of institutional arrangements and social dynamics will be illuminated by a consideration of the evolved capacities engaged. Far from being in opposition to the empirical generalizations of sociological institutionalism, an evolved perspective may complement them, by showing to what extent they occur as a probable result of human capacities and motivations.

4. Institutions and power relations: is evolution relevant?

Eastwood raises the question, whether an evolutionary psychology approach is relevant to situations in which power relations, specifically power asymmetries, are important in maintaining or stabilizing institutions: '[some institutions persist] not because they comport with our shared expectations and intuitions but because powerful actors impose them' [page 10 of Eastwood MS]. We certainly agree that power asymmetries may be involved – indeed they are probably

more pervasive than standard neo-institutional models warrant (Knight, 1995). However, far from being an objection to the proposed evolutionary perspective, we consider this an excellent argument for seeing institutions in terms of human evolved capacities and motivations.

Evolutionary considerations are relevant to power for two reasons. First, the power-related motivations and processes that may influence the diffusion and adoption of institutions are themselves a result of evolution. Second, in many situations political power requires a certain degree of legitimization, which itself is highly dependent on evolved psychology. Coercion only works so far unless it is accompanied by a certain degree of persuasion, which demands a certain fit between evolved preferences and the political order.

First, let us consider evolved dispositions and capacities for political power. Far from being separate from the domain of psychological processes, power relations a domain of social interaction where human evolution is most relevant. Humans evolved in societies with power asymmetries for millennia. All known human societies display power differentials (Brown, 1991). Even though most of human evolution took place in the context of societies with low stratification (see e.g. Maryanski and Turner, 1992), such groups do have power struggles and asymmetries. Indeed, the fact that they remain fairly egalitarian is generally the outcome of conflicts and a general resistance to *exaggerated* power asymmetry (Boehm, 1999), suggesting that an active interest in who has power over whom is an expected feature of human psychology. It should also be relatively ancient in evolution, since ancient forms of collective action, like group hunting, require not just coordination but also decision-making hierarchies (Dubreuil, 2010; Kelly, 1995). In line with these premises, recent work in psychology has uncovered the existence of sophisticated psychological mechanisms for gauging and representing the powerfulness of others in social situations (Fessler *et al.*, 2012; Sell *et al.*, 2009). Humans do have evolved capacities to engage in power relations, recognize power asymmetry, adjust their courses of actions to power hierarchies, in other words are 'political animals' by natural design.

Second, as noted above, humans across the world show a general distaste for exaggerated power asymmetries. In fact, humans display the extremely zoologically rare capacity to form coalitions among lower status individuals to overthrow despots (Boehm, 1999). Apparently, the constant threat to power holders from the numerical majority seems to create a psychological motivation to constantly legitimize power-based decisions with references to something else (religion, morality etc.). That is, stable power does not grow solely out of the barrel of a gun but is deeply indebted to speech acts that serve to frame and legitimize the decisions of the powerful. This legitimizing process, it is important to observe, is largely influenced by evolved preferences, as these preferences are basic vehicles behind the targets' intuitions about just and unjust. Successful framing attempts require that the content fits these intuitions. That is why communist regimes for instance tried to justify enormous power inequalities

between the Party and the masses in terms of (evolved) human intuitions about fairness – ironically, this was done by political entrepreneurs whose doctrine excludes the notion of a stable, evolved human nature (Munro, 1971). In a less extreme fashion, many modern states, with their appropriation of violence, were propped up by nationalist ideologies that activate intuitions about small-group, kin-based cooperation (Gellner, 1983; Smith, 1987).

5. The general picture: institutions, coordination and collective action

At the end of our original paper, we argued that there was little scope for a general 'theory of institutions', given the variety of mental systems involved and their associated preferences. This point is reinforced by Eastwood's impressive list of diverse institutions [page 8 of Eastwood MS], which would indeed suggest that social scientists can hope to formulate only 'a few vague meta-institutional rules' rather than achieve descriptive and explanatory adequacy in this domain. We agree with Eastwood's general feeling concerning the prospect of a general theory of institutions. But it is worth mentioning that the 'meta-institutional' principles we suggested, far from being altogether vague, can serve as guiding principles in empirical research on institutions.

The design of institutions could be attributed (1) to external and apparently arbitrary cultural values and preferences, as in 'substantive' approaches in economic anthropology (see e.g. Gudeman, 1986); (2) to an optimal, rational response to objective conditions, as in the economic approach to institutions (see e.g. Posner, 2001); or (3) as an attempt to reduce transaction costs by adopting apparently non-rational rules of the game, as in neo-institutional approaches (see e.g. North, 1990). Our interpretation of institutional design is closest to this last perspective, with the crucial difference that in our view human evolved capacities and preferences play a crucial role in favoring particular institutional designs.

We have therefore suggested that many social institutions play the role of coordination tools that help orchestrate social interaction in situations where the parties could potentially experience a range of different motivations, and there is shared uncertainty which of these motivations is in fact experienced. This is clearly true of marriage and of wedding rituals, which trigger and orchestrate different agents' responses to crucial changes in mating opportunities (Boyer, 2001). The same could be said for more informal institutions such as tipping in restaurants, which coordinates motivations to the waiters' and diners' mutual benefit. Because a tip is paid only after the service is delivered, the customer faces a set of cross-cutting motivations that are essentially reducible to the second player's motivations in a sequential Prisoner's Dilemma game. One motivation is to reciprocate after satisfactory service. Another one is to free-ride on the waiter's efforts and tip nothing. By backward induction, this latter possibility should motivate a waiter to under-deliver. In such situations, recognized institutions (such as the institution that one should and usually does

leave a tip) enable the involved parties to coordinate on and commit to a specific mode of interaction (the waiter is helpful and the customer tips to the mutual benefit of both). The point here, however, is again that the institution does not exist independently of our psychology but precisely exists because of our evolved psychology and because everybody (intuitively) recognizes how our evolved psychology of cooperation produces these cross-cutting motivations in the particular situation.

Accepting that institutions serve coordination purposes does not lead to a general 'theory of institutions', however. In most of the rational actor literature on collective action, formal models suggest that cooperation between self-interested agents is generally not possible, but also that under specific additional conditions, *any* type of collective action is possible (Medina, 2007; Olson, 1965). By contrast, we have argued that coordination for social action is not *one* single problem in social interaction. Achieving coordination in the mating pool, in the provision of economic resources, in defending one's nation, in establishing a social welfare system, probably requires different types of institutions because these domains activate completely different strategies and motivations.

This view of collective action suggests that we can explain institutions only against the background of domain-specific psychological capacities and motivations. In his comments on our argument, Eastwood contends that some recurrent features of institutions are 'clearly and irreducibly social, [...] a function of social processes [...] and not [of] some underlying psychological substratum' [page 11 of Eastwood MS]. But we do not consider a division between 'psychological' and 'social' levels of reality as either ontologically valid or empirically useful. Human collective action requires the aggregation of a great many individual decisions. In our view, the computational rules that underpin such decision-making were put in place by natural selection and are realized as distinct algorithms in human brains.

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