I General

I.1 Khalil, Elias (1988) Five Careers of the Biological Metaphor in Economic Theory Journal of Socio-Economics 27(1) pp.29-52

The paper distinguishes among five different roles which the biological metaphor has played, or could pay, in economic theory. First, the "selfish-gene" metaphor shows that non-human agents allocate scarce resources and behave non-selfishly according to rationality optimization – not different from how neoclassical theory models human choice. Second, the "ecological influx" metaphor examines the prowess of the non-human/human agent to produce surplus (net product), which differs from rationality optimization. Third, the "genotype" metaphor casts light on how the technology/institution scheme informs the development and behavior of organization. Fourth, the "organism" metaphor illuminates the order of organizations such as firms and states. Fifth, the "ecosystem" metaphor explicates the order of markets, which differs from the order of organizations.

I.2 ★Hirshleifer, J (1977) "Economics from a Biological Viewpoint," The Journal of Law and Economics 20(1) 52 pages.

no abstract

I.3 Alexander, Victoria "Neutral Evolution and Aesthetics: Vladimir Nabokov and Insect Mimicry" working paper, santa fe institutute

Although Vladimir Nabokov may be better known for his outstanding literary achievements, particularly as the author of the novel *Lolita* (1955), he had an equally impressive genius for science. While acting as curator at Harvard's Museum of Comparative Zoology in the 1940s, he became an expert on a group of butterflies popularly known as "Blues." He named one species and several have been named after him. He published nine articles on lepidoptery in a number of prestigious scientific journals. During this time, he also developed compelling opinions about evolution. He argued, rather heretically, that some instances of insect mimicry did not result from Darwinian survival strategies; that is, slight resemblances could not be furthered by the *function* or *purpose* they served, leading *gradually* to better resemblances. I contend Nabokov was partially correct in his belief. Recent advances in evolutionary biology, namely structural evolution and neutral evolution, can be shown to support his argument. I also argue it was Nabokov's aesthetic interest in the mechanisms behind teleological phenomena that gave him the insight he needed to construct a theory of mimicry that was quite progressive for his time.

II Altruism and Cooperation

II.1 ★Ben-Ner, Avner and Louis Putterman, "On some implications of evolutionary psychology for the study of preferences and institutions" Journal of Economic Behavior & Organization Vol. 43 (2000) 91–99.

In many economic interactions, for instance in firms, the standard approximation of strict selfinterest is inadequate to modeling human behavior. A scientific theory of preferences, grounded in evolutionary psychological and biological theory, can avoid resort to ad hoc assumptions. Evolutionary theory is supported by a growing body of data including new results in experimental economics. It holds that the evolved human nature includes an ability to solve social dilemma problems through reciprocity and punishment of cheaters. Treating realized preferences as phenotypic expressions with both environmental and genetic causes will also allow economists to study the impact of institutions on preferences. © 2000 Elsevier Science B.V. All rights reserved.

II.2 Bester, Helmut and Werner Güth, "Is altruism evolutionarily stable?" Journal of Economic Behavior & Organization Vol. 34 (1998) 193-209.

We develop an evolutionary approach to explain altruistic preferences. Given their preferences, individuals interact rationally with each other. By comparing the success of players with different preferences, we investigate whether evolution favors altruistic or selfish attitudes. The outcome depends on whether the individuals' interactions are strategic complements or substitutes. Altruism and self-interest are context dependent.

II.3 Hirshleifer, Jack and Juan Carlos Martinez Coll (1988) What Strategies can support the evolutionary emergence of cooperation? Journal of Conflict Resolution 32(2) 367-398.

Axlerod found TIT-FOR-TAT to be a highly successful strategy in the Prisoner's Dilemma payoff environment. He concluded that a natural selection process in favor of TIT-FOR-TAT explains the evolutionary emergence of cooperation. This article shows that, contrary to Axelrod, TIT-FOR-TAT does not approach 100% fixation in the population. More generally, TIT-FOR-TAT is not a robustly successful strategy if Axelrod's exact assumptions do not apply – for example, if there is a *cost of complexity* or a

probability of error, or when players compete in an elimination contest rather than a round-robin tournament. In fact, it is unreasonable to expect any single strategy to win out in evolutionary competition. Constructively, we show that the presence of a PUNISHER strategy typically generates, consistent with observation, an interior equilibrium in which more and less cooperative strategies simultaneously coexist.

II.4 Stark, Oded Siblings, strangers, and the surge of altruism Economics Letters 65 (1999) 135–142

We demonstrate how altruism can surge in a population of nonaltruists. We assume that each individual plays a one-shot prisoner's dilemma game with his or her sibling, or with a stranger, and that the probability that an individual survives to reproduce is proportional to his or her payoff in this game. We model the formation of couples and the rule of imitation of parents and of nonparents. We then ask what happens to the proportion of altruists in the population.We specify a case where the unique and stable equilibrium is one in which the entire population will consist of altruists. © 1999 Elsevier Science S.A. All rights reserved.

II.5 Hirshleifer, Jack (2001) There are many evolutionary pathways to cooperation Journal of Bioeconomics 1 p 73-93.

Current sociobiological discussions attribute the evolution of cooperation to only two main influences: kinship and reciprocity. As a baseline, the paper analyzes the extent of incidental cooperation achieved in three important 2 x 2 payoff environments (Prisoner's Dilemma, Chicken, and Tender Trap) and the two simplest 'rules of the game' or protocols of play (single-round simultaneous-move and single round sequential move). Kinship promotes cooperation beyond these base levels by modifying payoffs of selfish versus unselfish behaviors. Reciprocity may also promote cooperation, but its expression requires protocols that widen available strategy sets (in comparison with the basic strategies in the underlying 2 x 2 payoff matrices). Once payoff modifications and/or more elaborate protocols are allowed, many other pathways to cooperation are opened up. Among them are punishment options, complementary strategy mixes, recognition effects, coordination using external clues, and group selection.

II.6 ★Sober, Elliott and David Sloan Wilson (1988) Unto others: The evolution and psychology of unselfish behavior

Explores the concepts of altruism and selfishness in evolutionary biology, psychology, and philosophy and builds a strong case for both evolutionary and psychological altruism. Introduces altruism as a biological concept. Presents the arguments for and against group selection and highlights the emergence of a unified evolutionary theory of social behavior that predicts the frequent evolution of genuine altruism and other group-advantageous behaviors. Discusses natural selection as a multilevel process that sometimes molds groups into adaptive units. Presents a series of models that show why genealogical relatedness is not required for group selection to be a strong evolutionary force and explains why group selection may have been an especially important force in human evolution. Surveys twenty-five randomly selected human cultures around the world to test theoretical models of human groups as adaptive units. Discusses motives as proximate mechanisms. Maps out three psychological theories of motivation--hedonism, egoism, and altruism. Reviews the psychological evidence and philosophical arguments relevant to the controversy concerning psychological egoism and altruism. Addresses how evolutionary considerations bear on the question of psychological motivation. Sober is Vilas Research Professor and Hans Reichenbach Professor of Philosophy at the University of Wisconsin, Madison. Wilson is Professor of Biology at the State University of New York, Binghamton. Index. [Book]

II.6.1 Zywicki, Todd J. (2000) - "Was Hayek Right about Group Selection after All?": Review Essay of Unto Others: The Evolution and

Psychology of Unselfish Behavior, by Elliott Sober and David Sloan Wilson Review of Austrian Economics 13(1) p81-95

AB - One of the most controversial aspects of Hayek's social theory was his acceptance of the concept of cultural group selection. The publication of Unto Others: The Evolution and Psychology of Unselfish Behavior provides an opportunity to revisit this much-maligned component of Hayek's thought. Sober and Wilson are concerned with biological group selection, but much of their argument is equally applicable to cultural group selection. This essay revisits Hayek's views on cultural group selection in light of the model proposed by Sober and Wilson. Comparing their model to Hayek's model suggests that group selection theories are more plausible than traditionally thought and that their viability in any given situation is an empirical, not an a priori, question. So long as there are benefits to a group from greater levels of altruism and cooperation, and so long as free rider problems can be mitigated, group selection models are plausible. [Journal Article; http://www.wkap.nl/journalhome.htm/0889-3047 Publisher's UR L]

II.6.2 FIELD, ALEXANDER J. Unto others: The evolution and psychology of unselfish behavior Sober, Elliott; Wilson, David Sloan; ISBN: 0-674-93046-0 cloth; 0-674-93047-9 pbk; Cambridge and London; Harvard University Press; 1998 Journal of Economic Literature 39(1) 132-4

The standard economic model embodies an implicit theory of human nature based on the assumption that individuals are egoistic. Sometimes this means no more than that we are purposive, and act in satisfaction of our own desires, in which case it is irrefutable. More often, the assumed egoism is more restrictive: people are viewed as selfish in the sense that they are interested only in efficiently maximizing their material welfare. In many cases, this has been taken as axiomatic; when pressed for justification, a typical support has been Darwinian: individuals who had predispositions to act otherwise would, over eons, have suffered a relative fitness disadvantage.Clearly, if natural selection operated only at the level of the individual organism, the above argument for egoism would be unassailable. Darwin recognized, however, that group beneficial traits might evolve, even if, within each group, they imposed a fitness disadvantage and were thus losing ground. How, exactly, could this happen? Suppose a population divides into groups among which there is variation in the frequency of a trait. If the trait is altruistic, it will impose a fitness cost on each individual exhibiting it, and the share of altruists in each group will decline. Suppose further that there is a positive covariance between the frequency of altruists in a group and group growth rates. Finally, assume some mechanism for the periodic pooling of offspring into a global population that then reforms into new groups. Under these conditions it is possible for a trait that is declining in frequency within every single group nevertheless, over time, to be increasing within the global population.With the important exceptions of work by Gary Becker (1976, The Economic Approach to Human Behavior. Chicago: U. Chicago Press, pp. 284, 294), Jack Hirshleifer (1977, "Economics from a Biological Viewpoint," J. Law Econ. 20, pp. 1-52) and Paul Samuelson (1993, "Altruism as a Problem Involving Group versus Individual Selection in Economics and Biology," Amer. Econ. Rev. 83, pp. 143-48), the possibility of group-level selection has been virtually ignored in economics. And within evolutionary biology, the idea has been in the intellectual doghouse at least since the publication by George Williams of Adaptation and Natural Selection: A Critique of Some Current Evolutionary Thought (1966, Princeton: Princeton U. Press). Williams emphasized the barriers that altruistic traits would have had to surmount, as well as the ways in which traits that apparently benefited the group could in fact be sustained by selection at the individual level. Over the last two decades, Sober, a philosopher of science, and Wilson, a biologist, have worked tirelessly to rehabilitate the mechanism.In this book they bring together theoretical work, laboratory experiments, simulations, and field observation to make their case. Williams suggested, for example, that a female-biased sex ratio would be evidence of the operation of group selection. Sober and Wilson document not only the evidence for female-biased sex ratios in many species of arthropods, but also the citations indicating that George Williams now accepts data of this type as evidence of such a mechanism (p. 43).This is revolutionary stuff, and the first three chapters of Unto Others are an intellectual tour de force, offering an overview of the intellectual history of the concept, a reworking of the assumptions necessary for it to operate, and a defense of its empirical importance. The precise

mathematical formulas for decomposing selection into, within, and between group components were developed by George Price (1970, "Selection and Covariance," Nature 277, pp. 520-21; 1972, "Extension of Covariance Selection Mathematics," Annals of Human Genetics 35, pp. 485-90). Within the context of the Price equations, the model advanced by Sober and Wilson provides a rationale for a replicator dynamic that could allow an altruistic trait to overcome within-group selection against it upon first appearance at low frequency.The second half of their book is more philosophical and less empirical: it is concerned with whether humans have, in addition to their egoistic tendencies, tendencies to be altruistic toward others, not only when it makes them "feel better," but even in circumstances where it may not. Although these chapters are replete with many valuable insights, I found them to be less tightly argued than those in the first part of the book.An important piece missing in Sober and Wilson's analysis is an adequate distinction between the role of group selection in driving an evolutionary dynamic and its possible role in sustaining an equilibrium once established. The distinction is crucial in understanding the relationship between the explanations of altruism toward kin and non-kin. In the 1960s William Hamilton developed the concept of inclusive fitness to explain the former: sacrificing yourself to save two or more of your children might not be a winning strategy for you, but it is a winning strategy for your genes. Most evolutionary biologists endorse kin selection, although perhaps not the interpretation of it as involving group selection.In contrast, the idea that group selection has played a role in the evolution of altruistic behavior toward non-kin has been resisted. While some of this may be due simply to hardheadedness, there is another consideration that Sober and Wilson do not recognize. Both types of altruism may require group selection in their evolution to higher frequencies following first appearance. But whereas altruism towards kin requires group-level selection to maintain itself in evolutionary equilibrium, altruism toward non-kin may not, once it has attained some critical frequency level within the population. At sufficiently high frequencies, such behavior becomes mutualistic, and can be sustained by individual-level frequency-dependent selection alone, or for that matter, rational choice. This argument is developed in greater detail in Alexander J. Field (2001, Altruistically Inclined? Evolutionary Theory, the Behavioral Sciences, and the Origins of Reciprocity. Ann Arbor: U. Michigan Press).Sober and Wilson appear to lump all rejections of group selection under the rubric of what they call the "averaging fallacy:" the tendency to look at the combined effect of between-group and within-group selection on a gene and attribute all of the effect to individual-level selection alone. The observation that a "cooperative" strategy can be sustained in equilibrium in the absence of group selection is simply not an instance of this "fallacy." Group selection may play no role in the maintenance of this equilibrium, even though it may have played an essential role in evolution to this equilibrium.These points aside, this is an important book, worthy of attention by economists and others within the social sciences. The authors write with wit, humor, irony, and at times passion, but also pay careful attention to logic and evidence. For economists unaware of the issues surrounding group selection, a good place to begin would be the first three chapters of this book along with perhaps the last, in conjunction with the authors' 1994 target article in Behavioral and Brain Sciences (Wilson and Sober 1994, "Reintroducing Group Selection to the Human Behavioral Sciences," 17, pp. 585-654). The latter is followed by multiple responses from many prominent players in the field, and is illustrative of a publication institution that social scientists might well consider emulating. This short reading list provides a superb point of entry to a debate in biology with fundamental implications for research in the social and behavioral sciences, including economics. [Book Review]

II.7 Gintis, Herbert (2002) “The Hitchhiker’s Guide to Altruism: Gene-Culture Coevolution, and the Internalization of Norms” workpaper, sante fe institute

The *internalization of norms* refers to the tendency of human beings to adopt social norms from parents (*vertical transmission*) or socializing institutions (*oblique transmission*). *Authority* rather than *contribution to fitness* accounts for the adoption of internalized norms. Suppose there is one genetic locus that controls whether or not an individual is capable of internalizing norms. We extend classical models (Cavalli-Sforza and Feldman 1981, Boyd and Richerson 1985) to show that *if adopting a norm is fitness enhancing, fixation of the allele for internalization is locally stable, and with a small amount*

of oblique transmission, fixation is globally stable. We use this framework to model Herbert Simon's (1990) explanation of altruism. Simon suggested that altruistic norms could 'hitchhike' on the general tendency of the internalization of norms to be fitness-enhancing. We show that *the altruistic phenotype evolves if and only if there is a sufficient level of oblique transmission of internalizable norms*. This result holds even when there is a strong horizontal transmission process biased against the altruistic norm. We then use a geneculture coevolutionary group selection argument to explain why internalized traits are likely to be pro- as opposed to anti-social.

II.8 Gintis, Herbert (2001) "The puzzle of Prosociality" working paper

How is cooperation among large numbers of unrelated individuals sustained? Cooperation generally requires *altruism*, where individuals take actions that are group-beneficial but personally costly. Why do selfish agents not drive out altruistic behavior? This is the *puzzle of prosociality*. Altruism is supported by culture. Sociology treats culture as a set of norms that are transmitted by socialization institutions and internalized by individuals. Altruism, in this approach, is thus sustained by the internalization of norms. Biology treats culture as knowledge that is passed to children from parents (vertical transmission), from other prominent adults (oblique transmission), and from peers (horizontal transmission), such that individuals with higher payoffs have a higher level of biological fitness, leading norms to follow a dynamic of Darwinian selection. Altruism, in this approach, can be sustained only if group selection is feasible, which it rarely is. Economics uses evolutionary game theory to model culture as strategies deployed in social interaction that evolve according to a replicator dynamic, in which individuals shift from lower to higher payoff norms. In this approach, altruism cannot be sustained, but cooperation is possible with repeated interactions and a sufficiently low discount rate. This paper integrates these approaches and shows that altruism, as well as norms that reduce both individual and group payoffs, can be supported in a stable equilibrium.

III Family/ Kin Selection

III.1 Hirshleifer, Jack (2001) There are many evolutionary pathways to cooperation Journal of Bioeconomics 1 p 73-93.

Current sociobiological discussions attribute the evolution of cooperation to only two main influences: kinship and reciprocity. As a baseline, the paper analyzes the extent of incidental cooperation achieved in three important 2 x 2 payoff environments (Prisoner's Dilemma, Chicken, and Tender Trap) and the two simplest 'rules of the game' or protocols of play (single-round simultaneous-move and single round sequential move). Kinship promotes cooperation beyond these base levels by modifying payoffs of selfish versus unselfish behaviors. Reciprocity may also promote cooperation, but its expression requires protocols that widen available strategy sets (in comparison with the basic strategies in the underlying 2 x 2 payoff matrices). Once payoff modifications and/or more elaborate protocols are allowed, many other pathways to cooperation are opened up. Among them are punishment options, complementary strategy mixes, recognition effects, coordination using external clues, and group selection.

III.2 Bergstrom, Ted 1994, On the evolution of altruistic ethical rules for siblings working paper.

This paper explores the evolutionary foundations of altruism among siblings and extends the biologists' kin-selection theory to a richer class of games between relatives. We show that a population will resist invasion by dominant mutant genes if individuals maximize a ''semi-Kantian'' utility function in games with their siblings. It is shown that a population that resists invasion by dominant mutants may be invaded by recessive mutants. Conditions are found under which a population resists invasion by dominant and also by recessive mutants. (JEL C70, D10, D63)

III.3 ★Bergstrom, Ted 2000 Economics in a Family Way, (published where?) working paper version

This paper argues that the economics of the family can be much enriched by incorporating recent developments in evolutionary biology, animal behavior studies, cultural evolution, anthropology, and game theory. Evolutionary foundations of sympathy between relatives are explored. Applications of the theory of cultural evolution to the demographic transition and to wealth transfers between generations are investigated. The economics of marital institutions such as polygyny, polyandry, and matriarchy are discussed, as well as recent work by economists on non-monogamous mating arrangements in our own society. Applications of recent developments in non-cooperative bargaining theory and matching theory to the theory of marriage are presented.

III.4 Bergstrom Theodore (2000) Evolution of Behavior in Family Games

In 1964, the great evolutionary biologist, William Hamilton proposed that evolutionary selection would result in a population of individuals in which each acts to maximize its inclusive _tness, which Hamilton de_ned as a weighted average of its own survival probability and the survival probabilities of its kin, with the weights applied to relatives being proportional to their degree of relationship. Hamilton's papers were written almost 10 years before G. R. Price and John Maynard Smith introduced game theory to biologists. It is therefore not surprising that he did not model familial interactions as a game. The kind of interactions that Hamilton studied belong to a special class of games in which the e_ects of actions are additive. Many economic interactions between relatives lack this additive structure and it turns out for such interactions, Hamilton's rule does not apply. This paper introduces a more general principle that does apply for a broad class of games and explains the relation between this principle and Hamilton's rule.

III.5 Cox, Donald (2001) "How Do People Decide to Allocate Transfers Among Family Members?" working paper

Despite recent advances in data collection and the growing number of empirical studies that examine private intergenerational transfers, there still exist significant gaps in our knowledge. Who transfers what to whom, and why do they it? I argue that some of these gaps could be filled by departing from the standard parentchild framework and concentrating instead on fathers, mothers, sons and daughters in a way that accounts for fundamental—and sometimes obvious—male-female differences in concerns and objectives in family life.

Elementary sex differences in reproductive biology constitute the basic building blocks of studies of family behavior in many disciplines, but despite recent progress they get far less attention than they deserve in

economic studies of the family. I explore, separately, the implications of three basic biological facts for intergenerational transfer behavior. The first is paternity uncertainty: how does it affect the incentives of fathers, mothers and of various grandparents to invest in children? The second is differing reproductive prospects of sons versus daughters: when are sons a better investment than daughters and vice versa? The third is conflict: How much acrimony might we expect to occur in families, and why? In examining these issues I also explore household survey data from the United States. This preliminary evidence is consistent with non-biological as well as biological explanations of behavior. Nonetheless, the biological focus confers two advantages, by generating falsifiable predictions and by illuminating new avenues for empirical work. There is enormous potential for further micro-data-based empirical work in this area.

III.6 Bergstrom and Bergstrom (2000) "Does Mother Nature Punish Rotten Kids?"

no abstract

IV Sexual Selection

IV.1 Status seeking/matching

IV.2 ★Nöldeke, Georg and Larry Samuelson (2001) "Strategic Choice Handicaps when Females Pay the Cost of the Handicap" Bonn econ discussion paper 22/2001.

We examine a strategic-choice handicap model in which males send costly signals to advertise their quality to females. Females are concerned with the *net viability* of the male with whom they mate, where net viability is a function of the male's quality and signal. We identify circumstances in which a signaling equilibrium would require high-quality males to send signals so much larger than those of males in lower quality (to deter mimicry by the latter) as to yield lower net viabilities for the former. This causes females to shun males who send large signals, ensuring that there is no signaling equilibrium.

IV.3 Miller, Geoffrey A Review of Sexual Selection and Human Evolution: How Mate Choice shaped Human Nature forthcoming

go to article

1 Introduction

The application of sexual selection theory to human behavior has been the greatest success story in evolutionary psychology, and one of the most fruitful and fascinating developments in the human sciences over the last two decades. Ironically, this development would have seemed absurd only twenty years ago. At that time, many biologists considered sexual selection through mate choice to be Darwin's least successful idea: if not outright wrong, it was at most a minor, uninteresting, even pathological evolutionary process. At that time, any 'Darwinization' of the human sciences would have had to rely on natural selection theory, which bears much less directly on human social, sexual, and cultural behavior.

Instead, something remarkable happened: sexual selection theory was revived over the last two decades through the combined efforts of researchers in theoretical population genetics, experimental behavioral biology, primatology, evolutionary anthropology, and evolutionary psychology. Today, although natural selection theory serves as the conceptual and rhetorical foundation for evolutionary psychology (see Tooby & Cosmides, 1990, 1992), sexual selection theory seems to guide more actual day-to-day research (see Buss, 1994; Ridley,

1993; Wright, 1994).
This chapter reviews the current state of sexual selection theory, and outlines some applications to understanding human behavior. Sexual selection theory has been revived so recently that, while extraordinary opportunities exist for further research, many old misconceptions persist. These include the mistaken ideas that sexual selection:(1) always produces sex differences,(2) does not operate in monogamous species,(3) is weaker than natural selection, and(4) had nothing to do with the evolution of human intelligence, language, or creativity. One goal of this chapter will be to dispel some of these myths, and to bring evolutionary psychology up to date with respect to the biological literature on sexual selection. Sections 2 through 4 review the history and basic theory of sexual selection. Sections 5 and 6 contextualized human mate choice by covering sexual selection in primates and hominids. Sections 7 through 9 survey some possible roles of mate choice in shaping the human body, the human mind, and human culture. Finally, section 10 concludes with some

academic and existential implications of applying sexual selection theory to understand htiinan nature.

IV.4 Miller, Geoffrey Protean Primates: The Evolution of Adaptive Unpredictability in Competition and Courtship forthcoming (where?)

Machiavellian intelligence evolves because it lets primates predict and manipulate each others' behavior. But game theory suggests that evolution will not stop there: predictive capacities tend to select for unpredictability in counter-strategies, just as many competitive games favor "mixed" (stochastic) strategies. For example, prey animals often evolve "protean" (adaptively unpredictable) evasion behavior to foil the predictive pursuit tactics used by their predators. The same adaptive logic should apply to more abstract social tactics, but protean social behavior remains overlooked in primatology and psychology, because complex order rather than useful chaos has been considered the hallmark of evolved adaptations. This chapter re-views the notions of psychological--selection from evolutionary theory, mixed strategies from game theory, and protean behavior from behavioral ecology. It then presents six possible types of social proteanism in primates, and develops a model of how sexual selection through mate choice could have elaborated primate social proteanism into human creative intelligence.

V Selfish Gene

V.1 ★Case, Anne, I-Fen Lin and Sara McLanahan, (1999) HOW HUNGRY IS THE SELFISH GENE? NBER WP 7401 (published EJ(?))

We examine resource allocation in step-households, in the United States and South Africa, to test whether child investments vary according to economic and genetic bonds between parent and child. We used 18 years of data from the Panel Study of Income Dynamics, and compare food expenditure by family type, holding constant household size, age composition and income. We find that in those households in which a child is raised by an adoptive, step or foster mother, less is spent on food. We cannot reject the hypothesis that the effect of replacing a biological child with a non-biological child is the same, whether the non-biological child is an adoptive, step or foster child of the mother. In South Africa, where we can disaggregate food consumption more finely, we find that when a child's biological mother is the head or spouse of the head of household, the household spends significantly more on food, in particular on milk and fruit and vegetables, and significantly less on tobacco and alcohol. The genetic tie to the child, and not any anticipated future economic tie, appears to be the tie that binds.

V.2 ★Sacerdote, Bruce (2000) "The Nature and Nurture of Economic Outcomes" Nber 7949

This paper uses data on adopted children to examine the relative importance of biology and environment in determining educational and labor market outcomes. I employ three long-term panel data sets which contain information on adopted children, their adoptive parents, and their biological parents. In at least two of the three data sets, the mechanism for assigning children to adoptive parents is fairly random and does not match children to adoptive parents based on health, race or ability. I find that adoptive parents' education and income have a modest impact on child test scores but a large impact on college attendance, marital status, and earnings. In contrast with existing work in IQ scores, I do not find that the influence of adoptive parents declines with child age.

VI ★Utility Functions/ Evolution of Rationality

VI.1 Dawes, Robyn M. A message from psychologists to economists: mere predictability doesn't matter like it should (without a good story appended to it) Journal of Economic Behavior & Organization Vol. 39 (1999) 29–40

Stephen J. Gould (Pittsburgh, 3/3/97) recently defined humans as 'the primates who tell stories.' This paper reviews evidence for a more radical definition as 'the primates whose cognitive capacity shuts down in the absence of a story' when attempting to incorporate probabilistic information to make a coherent probabilistic inference. Thus, people cannot conform ('descriptively') to the standard expected utility (EU) model of economic decision making, given that probabilities often cannot be combined either implicitly or explicitly in the absence of a good, clearly relevant story justifying the combination. Moreover, that inability severely limits the standard EU model for use in prescriptive decision making. ©1999 Elsevier Science B.V. All rights reserved.

VI.2 Khalil, Elias L. (2000) "Survival of the Most Foolish of Fools: The Limits of Evolutionary Selection Theory" Journal of Bioeconomics 2(3) 203–220.

The paper investigates whether evolutionary selection, in nature or the market, ensures the survival of rational agents. It argues that once rationality appears, evolutionary selection can account for its diffusion- but cannot account for its appearance in the first place. This issue differs from the investigation of whether history matters. The issue of history or path-dependency focuses on whether evolutionary selection can favor the survival of the potentially most productive apparatus (in the biological or technological sense). To show this, the paper commences with the much-neglected difference between efficiency and productivity.

VI.3 Robson, Arthur J. (2001), "The Biological Basis of Economic Behavior" Journal of Economic Literature 39(1) 11-33.

This paper first considers the implications of biological evolution for economic preferences. It analyzes why utility functions evolved, considers evidence that utility is both hedonic and adaptive, and suggests why such adaptation might have evolved. Time preference and attitudes to risk are treated--in particular, whether the former is exponential and the latter are selfish. Arguments for another form of interdependence--a concern with status--are treated. The paper then considers the evolution of rationality. One hypothesis examined is that human intelligence and longevity were forged by hunter-gatherer economies; another is that intelligence was spurred by competitive social interactions.

VI.4 Robson, Arthur J. (2002) "Evolution and Human Nature" Journal of Economic Perspectives 16(2) 89-106

This paper considers how biological evolution shaped the elements of a simple but complete model of economic decision making. These elements are

preferences, beliefs and rationality. Whereas Nature might impose preferences over consumption on the individual, Nature might optimally allow beliefs to be influenced by local knowledge and final choice to be flexible. This reinforces the usual approach. On the one hand, evolution also suggests that some extensions of this model are implausible; on the other, it suggests unexpected directions of generalization. In any case, evolution provides a basis for an overarching economic theory and maintains restrictions on this theory.

VI.5 Rogers, Alan "Evolution of Time Preferences by Natural Selection" AER 84(3) 460-481.

This paper entertains the hypothesis that human time preferences are in evolutionary equilibrium (ie that no mutation changing time preferences could be favored by natural selection). This hypothesis implies that the marginal rate of substitution (MRS) holding Darwinian fitness constant must equal the MRS holding utility constant. Furthermore, in a market economy the latter must equal the MRS in exchange. Exploiting these principles, I find that the long-term real interest rate should equal ln(2) per generation (about 2 percent per year) and that young adults should discount the future more rapidly than their elders.

VI.6 Waldman, Michael (1994) "Systematic Errors and the Theory of Natural Selection" AER 84(3) 482 – 497.

This paper derives two main results. First, in a world where inheritance is sexual as opposed to asexual "second-best" adaptations can be evolutionarily stable. That is, the adaptation selected need not be the optimal solution to the evolutionary problem at hand. Second, I apply this result to show that natural selection provides a potential explanation for why in many settings humans commit errors that are systematic in nature

VI.7 Castronova, Edward (2001) Acheivement Bias in the Evolution of Preferences Gruter Institute Working Papers on Law, Economics, and Evolutionary Biology

The paper develops an evolutionary selection model of the cultural transmission of preferences, focusing on the survival probability of certain preference types. The _tness of a preference is de_ned in terms of the ease with which its carrier can transmit the preference to the young. For example, a taste for work gives its carriers more income than is obtained by those who carry a taste for leisure. If higher income allows a given carrier to transmit her preferences more easily, then those with a taste for work will be more likely to transmit their preferences to the young; hence a taste for work will be more evolutionarily _t than a taste for leisure. In general, cultural transmission of preferences will favor any tastes that facilitate their own transmission, especially tastes for social achievements such as income, power, mass communication, and knowledge. The resulting pattern of tastes can be biased in the following sense: if the young generation were not inuenced by achievement e_ects, they would choose preferences that would make them happier.

VII Group Selection

VII.1 ★Bergstrom, T. (2002) "Evolution of Social Behavior: Individual and Group Selection" Journal of Economic Perspectives 16(2) 67-88.

How selfish does our evolutionary history suggest that humans will be? We explore models in which groups are formed and dissolved and where reproduction of individuals is determined by their payoffs in a game played within groups. If groups are formed "randomly " and reproductive success of group founders is determined by a multiperson prisoners' dilemma game, then selfish behavior will prevail over maximization of group payoffs. However, interesting models exist in which "group selection "sustains cooperative behavior. Forces that support cooperative behavior include assortative matching in groups, group longevity and punishment-based group norms.

VIII Evolutionary Psychology

VIII.1 ★Ben-Ner, Avner and Louis Putterman, “On some implications of evolutionary psychology for the study of preferences and institutions” Journal of Economic Behavior & Organization Vol. 43 (2000) 91–99.

In many economic interactions, for instance in firms, the standard approximation of strict selfinterest is inadequate to modeling human behavior. A scientific theory of preferences, grounded in evolutionary psychological and biological theory, can avoid resort to ad hoc assumptions. Evolutionary theory is supported by a growing body of data including new results in experimental economics. It holds that the evolved human nature includes an ability to solve social dilemma problems through reciprocity and punishment of cheaters. Treating realized preferences as phenotypic expressions with both environmental and genetic causes will also allow economists to study the impact of institutions on preferences. © 2000 Elsevier Science B.V. All rights reserved.

VIII.2 ★Cosmides, Leda and John Tooby, (1994) Better than Rational: Evolutionary Psychology and the Invisible Hand AER 84(2) 327-332

no abstract

VIII.3 ★Vromen, Jack (2002) Stone Age Minds and Group Selection--What Difference Do They Make? Constitutional Political Economy 13(2) p 173-195

The paper sets out to identify main tenets of evolutionary psychology (EP)--with its characteristic slogan that "our present skulls still house a stone age mind"--and Sober and Wilson's multi-level selection theory (MST)--that seeks to rehabilitate group selection in evolutionary theorising--that could be of interest to economic theorising. Four different types of altruism are distinguished. It is further investigated what implications EP and MST have for the study of the psychic mechanisms underlying human behaviour, of the co-evolution of intragroup and intergroup processes, and for methodological individualism. [Journal Article; http://www.kluweronline.com/issn/1043-4062 Publisher's URL]

VIII.4 Jackson, Tim, Evolutionary psychology in ecological Economics: consilience, consumption and contentment Ecological Economics 41 (2002) 289–303

This paper makes the case that if ecological economics seeks ‘consilience’ with biology it must acquaint itself with evolutionary theories about social development and human behaviour. The author reviews some of the literature in this area. Particular attention is paid to the newly emerging discipline of evolutionary psychology, which sets out a

neo-Darwinian view of human nature in which individual and social behaviour is dominated by the evolutionary strategies of the 'selfish gene'. The paper discusses the relevance of this perspective for two specific 'problem areas' in ecological economics. The first of these is the question of consumption and consumer behaviour. The second is the problem of 'mismatch' between the pursuit of economic growth and social well-being or contentment. These examples illustrate that evolutionary psychology may sometimes provide a natural ally for ecological economics, in particular pointing up certain failures of conventional economics. On the other hand, it also offers harsh lessons concerning the difficulty of changing evolved behaviour patterns. The paper suggests three possible avenues of response by ecological economists to the insights of evolutionary psychology. © 2002 Elsevier Science Ireland Ltd. All rights reserved.

VIII.5 Bloom, Howard (2001), Instant evolution. The influence of the city on human genes: a speculative case, New Ideas in Psychology 19 (2001) 203–220

The dominant view in today's evolutionary psychology is that our instincts were stamped into our DNA during the infamous EEA, ''The Environment of Evolutionary Adaptedness'' (Cosmides a Tooby, Evolutionary psychology: A primer. Santa Barbara: Center for Evolutionary Psychology, University of California, 1997. Retrieved June 1999 fromthe World Wide Web: http://www.clark.net/pub/ogas/evolution/EVPSYCH primer.htm). This is generally reckoned as a roughly two and a half million-year hunter-gatherer phase that ended before the climax of the last Ice Age. Since then, our genetically preprogrammed heritage has supposedly been locked in stone (or better yet, in an amino acid code). We are, so says the current argument, tribal hunter-gatherers decked out in modern clothes. However a strong case can be made for the possibility that human biology has continued to evolve during the 10,000 years since Jericho's builders erected the .rst city walls. Genes change far more speedily than most evolutionary psychologists realize. Natural selection has had 400 generations to rework our bodies and our brains since the days when Catal Huyuk, Suberde, and Tepe Yahya joined Jericho's mesh of intercity trade. Four thousand years before the rise of the Sumerian cities of Ur, Uruk, and Kish, Stone Age metropolises from Anatolia to the edges of India were already rich in challenges and opportunities. These urban traps and niches may well have been selectors forming much of what we are today. Homo urbanis has not only arrived, he has long since elbowed Homo tribalis far o. to the side. r 2001 Elsevier Science Ltd. All rights reserved.

VIII.6 ★Mitchell, Melanie "Can Evolution Explain How the Mind Works? A Review of the Evolutionary Psychology Debates" working paper santa fe institute

Introduction

Nothing in biology makes sense except in the light of evolution." It would be hard to find a biologist today who disagrees with geneticist Theodosius Dobzhansky's famous claim.

Darwin's theory of evolution via natural selection has done more than any other principle to explain the biological world, and to illuminate the relationships among all current life forms and among those found in the fossil record.

If nothing in biology makes sense without evolution, the same should be said for the behavior and thinking patterns|the psychology|of biological creatures such as ourselves. The human mind has been often described as the pinnacle of evolution: the most complex organ ever \designed" by natural selection. Darwin himself believed that his principles would

one day explain not only the biological world but the psychological; that due to his theory, "psychology will be placed on a new foundation."

After a long period in which the two fields were largely separate, evolutionary theory has recently begun to play a significant role in psychological research, most prominently

in an area called \Evolutionary Psychology." Just as evolutionary biologists attempt to explain the morphology and other explicit physical features of organisms by using evolutionary arguments, evolutionary psychologists want to explain people's thoughts, emotions, and behaviors by asking questions about their adaptive significance over evolutionary time.
\Evolutionary psychology is simply psychology that is informed by the additional knowledge that evolutionary biology has to offer, in the expectation that understanding the processthat designed the human mind will advance the discovery of its architecture."
Such a quest sounds eminently reasonable, no? One might expect that (biblical creationists and other anti-evolutionists aside) most people would find the evolutionary psychology research program uncontroversial and admirable.
However, it turns out that evolutionary psychology has engendered deep, emotional, and rancorous debates within the scientific community, not only in dry scientific seminars and journals but also in the more free-wheeling (and mud-slinging) pages of the New York Review of Books and other popular periodicals. Why?
In this essay, inspired by Steven Pinker's fascinating book, How the Mind Works and other expositions of evolutionary psychology, and by attacks on such works, I will explore, from an informed outsider's perspective, what evolutionary psychology is all about, where it came from, and what its prospects are in light of recent debates surrounding its controversial methodology and claims.

IX Institutions

IX.1 Watkins, John P. (1998) Towards a Reconsideration of Social Evolution: Symbiosis and Its Implications for Economics Journal of Economic Issues 32(1) 87-105

Neoinstitutionalists, sociobiologists, and neoclassical economists reduce social evolution to the rational choices of individuals, and in turn to selfish genes. This is supported by the neo-Darwinian synthesis, which asserts that evolution results from the competitive struggle among biological atoms. This view is challenged by the discovery of the pervasiveness of symbiosis. The individual organism is not the unit of selection; the relationships that define the organism determine the process. This is reminiscent of the vision of social evolution held by the old Institutionalists in which social evolution is the selection of institutions, that is, of patterns of human cooperation. [Journal Article]

IX.2 ★Basu, Kaushik (1995) “Civil institutions and evolution: Concepts, critique and models” Journal of Development Economics 46 p 19-33.

The paper examines the relation between civic norms and evolution. The survival of norms in the long run may depend on the evolutionary process and natural selection. The sieve of natural selection may ensure that norms which persist must have minimal efficiency properties. This paper begins with a general discussion of evolutionary processes and the survival of civil institutions. It then presents an introductory account of the theory of evolutionary games. It is argued that the model of evolutionary games is more suited to analyzing animal behaviour than the human one. Since it is the latter that is of interest to economists, an attempt is made in this paper to develop some new solution concepts which are more apt for human games.

IX.3 ★Bisin, Alberto and Thierry Verdier (2000) A model of cultural transmission, voting and political ideology European Journal of Political Economy (16) 5–29

In this paper, we present a model of cultural transmission of preferences on goods, some of which are provided publicly through simple majority voting. We emphasize the existence of a two-way causality between socialization decisions and political outcomes. This generates the possibility of indeterminacies and multiple self-fulfilling equilibrium paths in cultural change and politics. We provide then a rationale for ideologies and collective socialization institutions as coordination mechanisms allowing cultural groups to preserve or shift political power in favor of their preference profile in the long run. q2000 Elsevier Science B.V. All rights reserved.

IX.4 Bowles, Samuel and Astrid Hopfensitz "The Co-evolution of Individual Behaviors and Social Institutions" working paper.

We jointly address two puzzles, namely what accounts for the evolutionary success of both: (a) individually costly and group-beneficial forms of human sociality towards non-kin; and (b) those group-level institutional structures such as food sharing and monogamy which have emerged and diffused repeatedly in a wide variety of ecologies during the course of human history. We show that the frequency and consequences of intergroup conflicts may provide an important part of the answer to both questions: in-group beneficial behaviors may evolve if they inflict sufficient costs on out-group individuals while group-level institutions limit the individual costs of these behaviors. We model a co-evolutionary process in which individual traits are transmitted either genetically or culturally and in which the evolutionary trajectories of individual traits and social institutions are mutually determining. Our simulations show that if group-level institutions implementing resource sharing or non-random pairing among group members may evolve, group-level selection processes support the co-evolution of group beneficial individual traits along with these institutions, even where the latter impose significant costs on the groups adopting them. In the absence of these group-level institutions, however, group selection pressures support the evolution of group beneficial traits only when intergroup conflicts are very frequent, groups are small, and migration rates are low. Thus under parameter values which may bear some resemblance to the relevant environments during the first 90,000 years of anatomically modern human existence, in-group-beneficial individual traits and group-level institutions of resource sharing and social segmentation could readily evolve, the sociality of humans thus being in part a consequence of human capacities in social institution building.

IX.5 Fehr Ernst and Simon Gächter "Fairness and Retaliation: The economics of Reciprocity" Institute for Empirical Research in Economics Working Paper No. 40

This paper shows that reciprocity has powerful implications for many economic domains. It is an important determinant in the enforcement of contracts and social norms and enhances the possibilities of collective action greatly. Reciprocity may render the provision of explicit incentive inefficient because the incentives may crowd out voluntary

co-operation. It strongly limits the effects of competition in markets with incomplete contracts and gives rise to noncompetitive wage differences. Finally, reciprocity it is also a strong force contributing to the existence of incomplete contracts.

IX.6 Goodenough, Oliver (2001) "Cultural Replication Theory and Law" The Gruter Institute Working Papers on Law, Economics, and Evolutionary Biology

Does law itself evolve? It has been widely suggested that culturally transmitted behavioral information exhibits a Darwinian evolutionary dynamic. The argument is straightforward. Darwinian evolution has three basic elements: (i) replicative descent with (ii) variation, subject to (iii) a form of selection. Bundles of cultural information as diverse as language, religious practices, and how to bake bread pass with imperfect _delity from generation to generation. Some of the variants created by these imperfections are passed, non_randomly, to the next generation with greater frequency.

IX.7 Heller, Michael (2001) "The Economy of Property Forms" The Gruter Institute Working Papers on Law, Economics, and Evolutionary Biology

This essay explores a puzzle from the world of property theory, that is from the world of mine and yours, the basic social organizational molecules with which we build our sense of justice. The puzzle is this: why is there so little variety in the forms of property people use across the world? We lack a convincing theory for the \economy of property forms," where economy is understood in the sense of parsimony. Three partial answers have been suggested. First, the limited number of forms may keep people from wasting property through over_fragmentation. Second, the limit may economize on communication costs for third parties who want to buy or sell property. Third, the limit may be an inexpensive way to help verify ownership. But none of these theories accounts for why obsolete forms persist in many economies, and why value_increasing forms fail to be created. Perhaps a more satisfying answer will require looking to political economy and to cognitive psychology. For now, the economy of property forms remains a provocative question.

IX.8 Zak, Paul and Kwang Woo Park (2000) "Population Genetics and Economic Growth"

This paper builds an age-structured model of human population genetics in which agents are endowed with a high-dimensional genome that determines their cognitive and physical characteristics. Young adults optimally search for a marriage partner, work for firms, consume good, save for old age and if married, decide how many children to have. Applying to fundamental genetic operators, children receive genetic material from their parents. An agent's human capital (productivity) is an aggregate of the received genetic endowment and environmental influences. Thus, the population of agents and the economy co-evolve. The model examines the impact of social and economic institutions on economic performance, including inequality in income and genetic attributes, the transition to an information economy, population bottlenecks, matchmaking, and love. We find that institutional factors significantly impact economic performance by affecting marriage, family size, and the intergenerational transmission of genes.

IX.9 Geddes, Rick and Paul Zak (2000), "The Rule of One-Third"

The Rule of One-Third guaranteed wives one-third of their husband's estate upon marital dissolution through death or divorce. We document the historical ubiquity of this legal construct and show that without a wife's residual claim on her husband's estate, children's outcomes are imperiled. Using ancient Roman law as an example, we argue that the patriarch, or *paterfamilias* is the main legal entity with an interest in creating and enforcing the Rue of One-Third. Then, in a game-theoretic model, we demonstrate that the Rue of One-Third obtains when mothers' and fathers' marginal impacts on their children's human capital are equal. We conclude that the Rule of One-Third arose in many societies because it places the cost of marital dissolution on the household rather than society and solves a contracting problem between the husband and wife when each is specialized in tasks the other cannot perform well.

X Animals

X.1 ★Hirshleifer, Jack and Brian Skyrms (2001) Human Cooperation working paper.

Every social species is characterized by its social contract, which governs the ways in which individuals are programmed or induced to cooperate with some conspecifics and possibly engage in hostile interactions with others (Ardrey [1970], Skyrms [1996]). Social bees and ants fight suicidally for the colony as a whole. Humans also sacrifice for family or nation, but do so with a range of intensities that differs from individual to individual and varies greatly with the context. One form of cooperation observed among humans, mutual aid among kin, is common to a great many species. But cooperation with non-relatives or even strangers is less common outside the human sphere, and may depend upon evolved features of the human psyche such as ability to recall the past and to reason about the future.
Cooperation involves a problem of efficiency (producing something of common benefit) together with a problem of equity or fairness (dividing the gain in an acceptable way). Progress toward these ends is always threatened by organismic self-interest. We will be showing how such opposition of interests is resolved, more or less successfully, in different social contexts.

XI Demographic Transition

XI.1 Brezis, Elise (2001) Long-Run Growth and Demographic Transition Social classes, demographic transition and economic growth

Thispaper analyzesthe role of the demographic transition in the emergence of sustained economic growth, and shows that these two processes are related. Unlike previouscontributions which have focused on the importance of human capital, this paper suggests that capital accumulation, and the existence of di!erent social classes may provide an alternative explanation for the observed pattern of output, fertility rates and wages during the 19th century. The framework presented shows that during the "rst phase of industrialization, a decline in capital}labor ratio reducesthe wage rate and increases the dependency of the family unit on child labor, increasing fertility rates. However, in later phases the increase in the capital}labor ratio, due to the saving of the business elite, reduces the necessity of child labor bringing about the demographic transition. _ 2001 Elsevier Science B.V. All rights reserved.

XI.2 Galor, Oded and Weil, David N. (2000) - Population, Technology, and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond- American Economic Review 90(4) 806-828

AB - This paper develops a unified growth model that captures the historical evolution of population, technology, and output. It encompasses the endogenous transition between three regimes that have characterized economic development. The economy evolves from a Malthusian regime, where technological progress is slow and population growth prevents any sustained rise in income per capita, into a Post-Malthusian regime, where technological progress rises and population growth absorbs only part of output growth. Ultimately, a demographic transition reverses the positive relationship between income and population growth, and the economy enters a Modern Growth regime, with reduced population growth and sustained income growth. [Journal Article; http://www.vanderbilt.edu/AEA/pub.htm Publisher's URL]
ER -

XII Cloning

XII.1 Fransman, Martin (2001) Designing Dolly: interactions between economics, technology and science and the evolution of hybrid institutions Research Policy30, 263-273

This paper analyses the economic dimensions and implications of the processes that led to the cloning of Dolly, the sheep. It is shown that economic processes interacted intimately with technological and scientific processes in the designing of Dolly. Two contributions are made. The first provides a detailed example of the ways in which economic, technological, and scientific processes interact, thus contributing to the view that sees technology and science, not as exogenous forces driving economic change, but as endogenous processes in that change. The second contribution involves an analysis of the institutions within which the economic, technological and scientific processes were embedded. Attention is drawn specifically to the 'hybrid firm' that has emerged in science-based industries, embedded in the institutions of government research institutes and universities. The challenge posed to economists and social scientists is to enrich their theories of the firm in order to better capture the complexities of the hybrid firm and the institutions in which it is embedded. q 2001
Elsevier Science B.V. All rights reserved.

XII.2 Saint-Paul, G (2002) "Economic Aspects of Human Cloning and Reprogenetics" working paper.

1. INTRODUCTION

The issue of human cloning brutally entered the public debate in 1997 when Dolly, a sheep, was created with a genotype identical to that of its mother by Scottish scientists who used somatic nuclear transfer[2]. Immediately, a debate on the ethical issues associated with the prospects of human cloning arose. As of today, human cloning seems closer than ever, since a scientist has claimed to have implanted cloned human embryos, scheduled for birth in December 2002.

This paper analyses the economic issues associated with human cloning and new reproductive technologies. We analyze the incentives for human cloning and its implications for the long run distribution of skills and income. We analyse models of human cloning for different motives, focusing on those which tend to produce new human beings with improved ability. We thus ignore purely therapeutic applications, which may well be the most likely ones to happen in the near future, but have no first-order implications for the long-run distribution of skills and income.

We first briefly describe the technology of cloning and its recent advances. The second part of the paper discusses various economic incentives for cloning. It first analyses the consequences of cloning as a means of assisted reproduction. Next, we analyze the incentives to use cloning as a means of producing a high ability offspring in a couple

where one member has a higher ability than the other.
Finally, in section 3.3 we discuss cloning as a form of *financial investment*.[3] We argue that there will be strong economic incentives to clone people of exceptional value in the labor market. The extent to which the market will internalize this economic value depends, however, on how much of the return to the clone's genes can be appropriated by the agents who invested in creating the clone. We argue that the fraction that can be appropriated is likely to be small, but positive. If the clone's expected income is very large, this may be enough for cloning to be a profitable operation. A market for clones will then start operating, and we show that only the most talented people will be cloned, while women at the bottom of the ability distribution will specialize as physical mothers of the clones, thus getting a higher income than if working in the production sector.
An important consequence of these models is that if ability is genetically heritable, cloning tends to increase the proportion of high ability people in society, and that under some hypothesis the distribution of ability converges to a mass point at the highest possible ability level. Under weaker assumptions, it is shown that ability-reducing genes are eventually eliminated. However, if fertility is negatively correlated with ability, cloning leads to a strongly segregated society with a top-ability caste and a bottom ability one which produces clones of the top ability one.
Finally, Section 4 discusses the plausibility of these results in light on the evidence from economics and other sciences on marriage markets, child selection, assisted reproduction, and animals.

XIII Other (Game Theory)

XIII.1 Zizzo, Daniel John (2002) Between utility and cognition: the neurobiologyof relative position Journal of Economic Behavior & Organization Vol. 48 71–91

A positive correlation between relative position and the neurotransmitter serotonin exists in non-human primates, within an optimal range. This paper explores the reasons of this correlation. The main function of serotonin appears cognitive: it determines how optimally agents perceive and behave in game theoretical interactions, and this can explain the correlational finding. Among humans, within the optimal range serotonin works as a form of human capital, capable of improving the work functioning of agents who respond to serotonergic promoter treatment. Limitations of the existing evidence are also discussed. © 2002 Elsevier Science B.V. All rights reserved.

XIII.2 Weibull, Jorgen W. (1994) “The 'as if' approach to game theory: Three positive results and four obstacles” European Economic Review, 38(3-4) 868-881.

The usual justifications of non-cooperative solution criteria are rationalistic in nature, building on individual rationality and expectation-coordination postulates. In contrast, the 'as if' approach to game-theoretic rationality is evolutionary, arguing that even if strategically interacting agents do not meet these epistemic conditions, their long-run aggregate behavior will nevertheless conform with them because of the workings of biological or social selection processes. The present essay discusses three implications of evolutionary selection dynamics in favour of the 'as if' paradigm, and four potential obstacles to the general validity of these implications.

XIII.3 Bolton, G (1997) “The rationality of splitting equally” Journal of Economic Behavior & Organization 23, 365-381.

Conventional economic models seem unable to capture the propensity for 50-50 bargaining divisions observed in the lab. Experiments further suggest that something outside the usual set of economic parameters systematically influences bargaining settlements. I examine a simple bargaining model from a biological perspective. A limit evolutionarily stable strategy, FAIRMAN, makes 50-50 offers, punishes demands for more, and exploits demands for less. Fairman involves strategy perturbations resembling probes for concessions. When bargainers can use a signal to discriminate among partners, 50-50 is the unique limit evolutionarily stable outcome. The results suggest that some social conventions persist because they promote efficiency in an evolutionarily stable manner.

XIII.4 Hirshleifer, Jack (1998) “The Bioeconomic Causes of War” Managerial and Decision Economics 19, 457-466

Wars are fought not only for material goals but for intangible ends such as honor and prestige. In biologica terms the ultimate functional motives for fighting are food and sex, the essential elements of reproductive success. Like many other animals, humans seek food and sex directly, but also indirectly via dominance and prestige. In modern times the direct food and sex motives for warfare have waned. But, although largely disconnected from reproductive success, intangible goas such as prestige, dominance, and respect – amplified by the ‘affiliative instinct’ – remain with us as continuing causes of war.

XIII.5 Bisin, Alberto and Thierry Verdier (2001) “Agents with imperfect empathy may survive natural selection” Economics Letters 71 277–285

Cultural transmission mechanisms which favor the direct transmission of the parents’ traits to their children may be adaptive to natural selection when opposed to mechanisms in which the parents choose for the offspring.

XIII.6 Glaeser, Edward L., David Laibson, Jose A. Scheinkman, Christine L. Soutter (1999) “WHAT IS SOCIAL CAPITAL? THE DETERMINANTS OF TRUST AND TRUSTWORTHINESS” Nber Working Paper 7216

Using a sample of Harvard undergraduates, we analyze trust and social capital in two experiments. Trusting behavior and trustworthiness rise with social connection; differences in race and nationality reduce the level of trustworthiness. Certain individuals appear to be persistently more trusting, but these people do not say they are more trusting in surveys. Survey questions about trust predict trustworthiness not trust. Only children are less trustworthy. People behave in a more trustworthy manner towards higher status individuals, and therefore status increases earnings in the experiment. As such, high status persons can be said to have more social capital.

XIII.7 Landa, Janet (1999) The Law and Bioeconomics of Ethnic Cooperation and Conflict in Plural Societies of Southeast Asia: a Theory of Chinese Merchant Success Journal of Bioeconomics 1: 269–284, 1999

Synopsis: Overseas Chinese dominate merchant roles in the economies of Southeast Asia. Chinese merchant success has generated envy and hatred by indigenous populations, resulting in episodes of racial violence toward the Chinese. In order to understand the economic basis of inter-ethnic conflict and violence, it is necessary to understand the economic basis of success of Chinese merchants in Southeast Asia. The paper presents an economic theory of Chinese middleman success. Central to the theory is the idea that the Confucian code of ethics which emphasize the importance of mutual aid/reciprocity among kinsmen, fellow-villagers and those speaking the same dialect, enabled the Chinese to cooperate among members of their own dialect group to form a club-like ethnically homogeneous middleman group (EHMG) for the provision of infrastructure, essential for middleman entrepreneurship. Chinese merchants embedded in the EHMG were able to economize on transaction costs, and this gave them a differential advantage to out-compete other ethnic groups to appropriate merchant roles. The EHMG functions also as a 'cultural transmission unit' transmitting Confucian ethics to future generations of Chinese middlemen, hence maintaining Chinese merchant roles over time. The paper draws on some key concepts in the New Institutional Economics literature as well as modern evolutionary biology.

XIII.8 Kremer, Michael and Benjamin Olken "A Biological Model of Unions" Nber 8257

This paper applies principles from evolutionary biology to the study of unions. We show that unions which maximize the present discounted wages of current members will be displaced in evolutionary competition by unions with more moderate wage policies that allow their firms to live longer. This suggests that unions with constitutional incumbency advantages that allow leaders to moderate members' wage demands may have a selective advantage. The model also suggests that industries with high turnover of firms will have low unionization rates, and that there may be one equilibrium with high unionization and long-lived firms and another with low unionization and short-lived firms. These predictions seem broadly consistent with the data.

XIV websites

i have excluded the huge literature on evolutionary games – should i include this?

websites of economists
Jack Hirshleifer http://www.econ.ucla.edu/people/faculty/Hirshleifer.html

Ted Bergstrom http://www.econ.ucsb.edu/~tedb/

Arthur Robson http://publish.uwo.ca/~arobson/homepage.html

Herbert Gintis http://www-unix.oit.umass.edu/~gintis/

Grutner Institute working papers on law, economics and evolutionary biology (berkely)
http://www.bepress.com/giwp/default/

Centre on Economics Learning and Social Evolution (UC London) http://else.econ.ucl.ac.uk/
Santa Fe Institute, workgroup on Economics and Social Interactions
http://www.santafe.edu/sfi/research/focus/economicSocial/index.html

Behavioral Research Council of the American Institute for Economic Research
http://www.brc-aier.org/index.html

Center for Evolutionary Psychology, UC Santa Barbar
http://www.psych.ucsb.edu/research/cep/