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Law and Biology: Toward an Integrated Model of Human Behavior

*Owen D. Jones**

The theory of evolution . . . unites all the disciplines concerned with living beings.

François Jacob[1]

INTRODUCTION

As first year law students unhappily discover, the meaning of "law" is frustratingly protean, shifting by usage and user. Depending on whom you ask, law is a system of rules, a body of precedents, a legislative enactment, a collection of norms, a process by which social goals are pursued, or some dynamic mixture of these. Law's principal purpose is to define and protect individual rights, to ensure public order, to resolve disputes, to redistribute wealth, to dispense justice, to prevent or compensate for injury, to optimize economic efficiency, or perhaps to do something else. And yet one thing is irreducibly clear: at its most basic, every legal system exists *to effect some change in human behavior.* That is, law is a lever for moving human behavior.[2]

The very obviousness of this proposition obscures its significance. The principal implication is this: law depends on a behavioral model as a lever depends on a fulcrum. Only a behavioral model, which purports to explain why people behave as they do, can suggest that if law moves this way behavior will move that way. This means that the success of every legal system necessarily depends, in part, on the solidity—that is, the accuracy and predictive power—of the behavioral model on which it rests.

What *is* law's behavioral model? Surprisingly, little in legal culture or tradition has prompted us to dwell on this question explicitly. But we

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1. FRANÇOIS JACOB, THE LOGIC OF LIFE: A HISTORY OF HEREDITY 13 (1982).

2. At the same time, of course, law is itself a manifestation of human behavior. The important extent to which biology influences the development of morality and proto-legal institutions, such as ostracism, are beyond the scope of this work. For more on that topic, see OSTRACISM: A SOCIAL AND BIOLOGICAL PHENOMENON (Margaret Gruter & Roger Masters eds., 1986); JAMES Q. WILSON, THE MORAL SENSE (1993); FRANS DE WAAL, GOOD NATURED: THE ORIGINS OF RIGHT AND WRONG IN HUMANS AND OTHER ANIMALS (1996).

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should. Because when we do we discover that oftentimes the model against which we knowingly or unknowingly leverage is quite outdated—and that its increasingly apparent inaccuracy inevitably undermines law's ability to do well whatever it is we want it to do. True, nothing as decentralized as law can easily be said to reflect a unified anything, much less a single, well-defined, and conveniently criticizable behavioral model. Nonetheless, among the set of things policy-makers frequently take for granted is this: genes create body, and environment creates mind. It follows from this often unarticulated proposition that behavior (excluding that caused by reflexes, chemical imbalances, and the like) is simply what the mind tells the body to do. This, in turn, suggests that behavior can be shifted as easily (or at least with equal difficulty) in any direction. To properly shift behavior, it appears, law need only alter those socio-cultural influences that lead a mind to direct it.

This behavioral model (sometimes known as the Standard Social Science Model (SSSM)[3]) is tidy, straightforward, and pleasingly symmetrical. But it is certainly incomplete. It is inconsistent with an overpowering body of modern evidence, from numerous scientific disciplines, demonstrating what many people if truly pressed would probably admit: behavior is not that simple. Instead, all evidence now points to the same conclusion: genes and environment inseparably intertwine to create an indivisible individual that has a body *with* (rather than *and*) a brain. Genes affect body and brain; environment affects body and brain. Neither genetic substructure nor environment, neither "nature" nor "nurture," has any meaning, for any organism, except in the presence of the other.[4] Together, they influence both morphology *and* behavior, albeit in ultimately unknowable admixtures. This means that certain kinds of law-relevant behaviors are inevitably influenced by evolved, species-typical behavioral predispositions (by, that is, an evolved human psychology) just as species-typical body features (such as binocular vision and opposable thumbs) are necessarily products of the evolutionary processes by which they emerged. The fact that these widely-shared human predispositions are both acutely sensitive to small variations in environmental stimuli, as well as frequently malleable in the presence of human consciousness and will, does not significantly lessen their relevance.

If law is, as I believe it must be, a consumer of behavioral models, then it has historically been a passive one—either unaware of or untroubled by the increasing gap between the model its activities often reflect and the

3. John Tooby & Leda Cosmides, *The Psychological Foundations of Culture*, *in* THE ADAPTED MIND: EVOLUTIONARY PSYCHOLOGY AND THE GENERATION OF CULTURE 19, 23 (Jerome H. Barkow et al. eds., 1992) [hereinafter THE ADAPTED MIND].

4. *See generally* MATT RIDLEY, THE RED QUEEN: SEX AND THE EVOLUTION OF HUMAN NATURE 55-87 (1994); Paul R. Abramson & Steven D. Pinkerton, *Introduction: Nature, Nurture, and In-Between*, *in* SEXUAL NATURE, SEXUAL CULTURE 1, 1 (Paul R. Abramson & Steven D. Pinkerton eds., 1995) (arguing that "the nature/nurture debate is antithetical to scientific enquiry").

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best model available. Law's frequent reliance on outdated, incomplete, and oversimplistic theories of human behavior forces it to forgo opportunities to increase its effectiveness. We should expect more from the legal system, and the legal system should expect more from its behavioral model suppliers. In my view, the legal system should be an active participant in the process by which law-relevant social sciences and life sciences integrate to describe a more unified, internally consistent behavioral model—against which law can then more successfully leverage human behavior in whatever directions appropriate democratic processes prescribe.

This article is divided into four parts. Part I traces the principal cause of behavioral model obsolescence to disciplinary specialization and argues that an explicit emphasis within law on the construction and use of integrated behavioral models can help to reduce law's vulnerability to such obsolescence. Part II reviews the predicate stages of one method by which that emphasis can yield superior behavioral models. It illustrates the main features of that method with examples regarding child abuse. Part III builds on Part II to engage the central difficulty of how behavioral models can be integrated *in practice*. It shows how, for example, socio-cultural theories about human behavior toward juveniles and evolutionary theories about animal behavior toward juveniles, can be combined to yield a more accurate and more predictive model of child abuse in humans. Part IV then briefly addresses why such integrative exercises have important implications for law.

I. THE OBSOLESCENCE OF UNINTEGRATED BEHAVIORAL MODELS

People specialize because knowledge cumulates—and because our collective capacity to generate, store, and transmit information increasingly exceeds any individual's capacity to absorb it. Disciplinary divisions necessarily follow—both because the people of each successive generation master a smaller and smaller proportion of accumulated knowledge, and because there are some efficiency gains from a division of intellectual labor. But since disciplinary specialization necessarily trades breadth against depth, deepening knowledge tends to increase disciplinary isolation. This isolation, in turn, risks a Tower of Babel effect, in which impediments to the communication of information across individuals and societies foster waste—both in foregone opportunities for intellectual advance, and in the well-intentioned but ignorant pursuit in one discipline of what another has proved obsolete or inaccurate.

That waste is most problematic for disciplines, like law, that critically depend on the knowledge offered up by *other* disciplines. Whenever law relies upon aspects of any discipline that have been effectively obsolesced by events in yet another discipline, then law's own enterprise becomes

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vulnerable to failure. It is vulnerable in much the same way an effort to build an efficient engine would be vulnerable if the engine were designed to operate on anticipated chemical reactions, propounded by chemists, that violated fundamental laws of physics. Just as engineers need a model that integrates chemistry with physics, law needs a model that integrates the social sciences (upon which it currently and heavily relies) with the life sciences. For these remain largely unintegrated—and to posit a psychological or behavioral concept that is incompatible with evolutionary biology is as problematic as proposing a chemical reaction that violates the laws of physics.[5]

We should, of course, expect that *all* disciplines strive to create a "seamless system of interconnected knowledge."[6] That is, we should expect them to aggressively pursue mutual consistency, which ultimately demands compatibility of theory and data between relevant fields.[7] But history shows that expectation to be quirkily parochial. While we expect, for instance, that chemists and physicists should seek theories that unify their disciplines, we have cheerfully tolerated the most profound inconsistencies between the behavioral disciplines relevant to humans.

For example, the standard social science model, upon which much of our legal system's operations may unwittingly rest, typically grounds its behavioral theories on the presupposition that human existence can (with very few exceptions) be neatly divided into mind and body, the mental and the physical. It certainly appeared thus to our ancestors, since the uniquely well-developed abilities of our species in consciousness and thought, as well as the seeming inexplicability of those phenomena, suggested that our brains were not subject to the same causal processes that produced the rest of the natural world. Despite its dogged persistence, however, this generally unexamined assumption is merely a quaint reflection of the oversimplistic and outdated dualism of early Western culture, which can still be observed in such artificial constructs of oppositionality as: nature *versus* nurture; biological *versus* cultural; biological *versus* social; and animal *versus* human.[8]

The persistence of such dualism is an epiphenomenon of disciplinary specialization. To an important number of modern disciplines, however, the world no longer looks so conveniently binary. Recent advances in cognitive science, neurobiology, evolutionary biology, behavioral ecology, psychology, social anthropology, biological anthropology, and primatology, for instance, have revealed that the human brain is an

5. Leda Cosmides et al., *Introduction: Evolutionary Psychology and Conceptual Integration* [hereinafter *Evolutionary Psychology and Conceptual Integration*], *in* THE ADAPTED MIND, *supra* note 3, at 3, 4.

6. Tooby & Cosmides, *supra* note 3, at 19.

7. *See generally Evolutionary Psychology and Conceptual Integration*, *supra* note 5.

8. *See* Tooby & Cosmides, *supra* note 3, at 21 (discussing dualism).

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evolved physical structure, like any other in the body, that is inevitably the product of a general genetic blueprint in the presence of specific environmental building materials and affective conditions.[9] The brain's design and operation can be understood in terms of the same fundamental principles of physics and bio-chemistry to which all other aspects of life are subject. And this renders the mind/body dualism of the standard social science model artificial and misleading.[10]

For while one of the brain's principal purposes is to process highly complex information, the way it carries out that task is affected by its neural architecture. And because its neural architecture is genetically-influenced, the brain's processing pathways tend to reflect the cumulated result of hundreds of millions of years of natural selection. That is, to the extent that the way a brain processes information affects behavior, and to the extent that variance in behavior can yield variance in reproductive success ("RS"), gene combinations disposing a brain to processing patterns that tend to yield behaviors that increase the RS of an organism over the RS of its contemporaries tend, in turn, to spread to larger and larger proportions of each successive population.

Consequently, a great number of scientists from relevant fields now believe that what we refer to as the human mind must consist, at least in part, of a set of evolved information-processing mechanisms. Along with the developmental programs that yield them, they are adaptations produced by natural selection over evolutionary time in ancestral environments.[11] These mechanisms are believed to be richly structured in context-specific ways, and functionally specialized to produce behavior responsive to particular adaptive problems (such as mate selection, language acquisition, and the like).[12]

These evolved mechanisms are powerfully relevant to law, because they predispose the human mind to process particular *kinds* of information in emphatically non-random patterns, which tend in turn to produce non-random behavioral patterns observable in human societies.[13] This means that law cannot shift human behavior as easily in all directions. For even though the precise manifestations of these psychological information-processing mechanisms differ across populations and cannot be predicted

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9. The blueprint must be general because the human brain contains approximately 10^{15} synapses, while all the human chromosomes combined contain only about 10^5 genes. There is, therefore, not enough genetically coded information in the entire human genome to control every synaptic connection. TIMOTHY H. GOLDSMITH, THE BIOLOGICAL ROOTS OF HUMAN NATURE: FORGING LINKS BETWEEN EVOLUTION AND BEHAVIOR 75 (1991).

10. For a concise argument against such duality, see ROGER D. MASTERS, BEYOND RELATIVISM: SCIENCE AND HUMAN VALUES 134-43 (1993).

11. *See, e.g.*, Tooby & Cosmides, *supra* note 3, at 24.

12. *Id.*

13. This process inevitably contributes to (without rigidly dictating) the generation of "culture." And culture often reciprocally affects the very environments that, in turn, powerfully affect the way brains and bodies develop, interact with others, and sometimes reproduce.

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for any single individual (given infinitely varying environments, and the inevitable effects of chance) behavioral patterns that *do* emerge from large groups of people will tend to reflect the adaptive logic of the evolutionary processes by which the human species, with its human mind, emerged.[14] Law will encounter resistance that varies according to the strengths of evolved predispositions to those behaviors that law may attempt to regulate.[15]

The growing disjunction between the standard social science model, which does not reflect this understanding of the brain as an evolved physical structure, and the emerging, synthesized consensus of other disciplines, which do, therefore yields waste—both within areas of the research arms of isolated social sciences, and within the disciplines like law that for historical reasons have relied upon them, almost exclusively, for guidance on the causes of human behavior. An integrative process can combat this wastefulness by attempting to bring disparate pieces of knowledge together to synthesize from the best aspects of different disciplines an organic whole that is greater than the sum of its parts. One that is boundaryless in its applicability, internally consistent, and of immense practical import to law.

Although it is theoretically possible to integrate law's behavioral model at the highest level of abstraction and generality, such wholesale change is unlikely. In the near future it is probable that such conceptual integration must proceed on an incremental, case-by-case basis. I have therefore elsewhere proposed that law can be an active participant in integrating the topic-specific behavioral models on which it relies by undertaking the four-stage process (termed "evolutionary analysis in law") reproduced here in the Appendix.[16]

For evolutionary analysis in law to prove useful, one needs, in brief, to define law's goal with respect to a particular behavior, gather and evaluate relevant information about what influences that behavior, synthesize findings where appropriate, and apply the new knowledge in some fashion that yields material improvements in law's ability to pursue its tasks. Consequently, the first stage of the proposed model for evolutionary analysis in law, *The Identification Stage*, frames the subject to analyze. It clarifies one's legal goal, with respect to a defined aspect of human behavior, and assesses the likelihood that evolutionary analysis can aid

14. Despite common fears, this scientific understanding of mind leaves ample room for free-will and behavioral plasticity. It is *probabilistic*, not deterministic. At the same time, however, such an understanding does require that any comprehensive model of human behavior acknowledge that a number of common aspects of human psychology result in complex, condition-dependent behavioral predispositions, the strength of which may vary from very strong to very weak, and from individual to individual.

15. This theme is further developed in Wolfgang Fikentscher & Michael T. McGuire, *A Four-Function Theory of Biology for Law*, 25 RECHTSTHEORIE 291 (1994).

16. *See generally* Owen D. Jones, *Evolutionary Analysis in Law: An Introduction and Application to Child Abuse*, 75 N.C. L. REV. 1117 (1997).

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pursuit of that goal. *The Information Stage*, in turn, collates information from different disciplines on the multiple causes of the behavior relevant to pursuit of the legal goal. It describes how one can explore evolutionary theories on the origins of the behavior, examine the evidence bearing on those theories' falsifiable predictions, assess the fit between theory and evidence, evaluate robust theories' applicability in the human context, and decide whether to include any specific evolutionary theory in the decision-making processes by which law pursues its goal. For those evolutionary theories worthy of such inclusion, *The Integration Stage* then describes how to classify important differences between evolutionary and prevailing theories, to expose any true conflicts between them, and to integrate the best parts of each. *The Application Stage* subsequently applies the information generated by the previous stages to effect concrete improvements in the legal system. It describes how one can refine behavioral models, generate new legal strategies for pursuing pre-articulated legal goals, improve cost-benefit analyses that often drive various legal policies, and provide new directions for future research initiatives.

Because the keystone of evolutionary analysis in law is integration, in what follows I want to further examine the processes by which *The Integration Stage*, the third stage of evolutionary analysis in law, might usefully proceed.

II. EVOLUTIONARY ANALYSIS IN LAW: PREDICATES TO INTEGRATION

To consider more thoroughly the manner in which evolutionary analysis can assist in providing law with a more integrated behavioral model, it will be necessary to first sketch a scenario that will lay the foundation for subsequent discussion of the integrative process. Although this will take a few pages to lay out, and will require a brief summary of several themes I have explored elsewhere in greater depth,[17] I believe that in the end it will lend solidity to abstractions, help to clarify the overall structure, purpose, and utility of integration, and help to demonstrate what it would mean to engage in a process by which law informs itself of an integrated behavioral model. Of course, the integrative process is only relevant when the predictions of evolutionary theories[18] coincide robustly with empirical observations (for they will not always do so). After highlighting illustrative aspects of the theories and evidence, however, I will simply posit such robustness and move on, rather than try to prove it in a separate

17. *See id.*

18. As here used, "evolutionary theories" refers to the mid-level theories (or sub-theories) of the general meta-theory of evolution. *See generally* David M. Buss, *Evolutionary Psychology: A New Paradigm for Psychological Science*, 6 PSYCHOL. INQUIRY 1 (1995). Like many such meta-theories, its logic begets a variety of mid-level theories or operational principles, like those of "sexual selection," "parental investment," and the like, that address entire domains of functioning.

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discussion. My focus is not ultimately on *whether* the specific theories set out as examples in these predicate stages of evolutionary analysis are *in fact* robust, but rather on how, *assuming* that they are, they can usefully illustrate the integrative process, which is the subject of Part III.

Suppose we want to consider how a more integrated model of human behavior might aid the legal system in its efforts to reduce the incidence of child abuse.[19] During *The Identification Stage* of evolutionary analysis in law, we must first assess the extent to which prominent, prevailing theories about the causes of child abuse[20] have improved law's ability to regulate it, and then consider whether any theories grounded in evolutionary biology (or its close cousin evolutionary psychology) might contribute to an understanding of the phenomenon.

Child abuse is generally thought to follow from the complex interplay of exclusively social forces—including the summed influences of family, friends, and community—within the unique context of an individual's experience, including prior events, perceptions, and behavioral interactions. With somewhat more specificity (but still a high degree of generalization), the roughly forty-six theories purporting to explain child abuse sort loosely into four models.[21] The *Social-Cultural Model* attributes child abuse to the interaction of social stressors like poverty and abuse-relevant cultural norms. The *Social-Interactional Model* places primary emphasis on the unique characteristics and dynamic social context of each abusive parent-child relationship. The *Transitional Model* underscores the incremental process by which child abuse can follow from reduced stress-tolerance and mishandled provocations in the presence of "destabilizing factors." Lastly, the *Psychopathology Model* locates the root of child abuse, for at least

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19. By so early articulating a specific goal, one can minimize the extent to which subsequent evolutionary analysis could, even unintendedly, encroach upon the normative functions properly reserved to democratic processes. As many have noted, one would commit the "naturalistic fallacy" if arguing that a description from biology (an "is") could alone imply a normative conclusion in law (an "ought to be"). *See, e.g.*, DAVID HUME, TREATISE OF HUMAN NATURE 469-70 (Book III, Part I, Section I) (L.A. Selby-Bigge & P.H. Nidditch eds., 2d ed. 1978) (making famous the "no is to ought" formulation); G. E. MOORE, PRINCIPIA ETHICA 62, 89-110 (Thomas Baldwin ed., 2d ed., Cambridge University Press 1994) (1903) (coining "naturalistic fallacy" and using Social Darwinist Herbert Spencer as an example).

20. "Child abuse" has many meanings. *See, e.g.*, Richard Gelles, *What to Learn from Cross-Cultural and Historical Research on Child Abuse and Neglect: An Overview, in* CHILD ABUSE AND NEGLECT: BIOSOCIAL DIMENSIONS (Richard J. Gelles & Jane B. Lancaster eds., 1987) [hereinafter BIOSOCIAL DIMENSIONS] (discussing difficulties in defining child maltreatment). In this article, I use "child abuse" to refer to the intentional or negligent infliction upon children of non-sexual physical harm.

21. *See generally* Robert T. Ammerman, *Predisposing Child Factors, in* CHILDREN AT RISK: AN EVALUATION OF FACTORS CONTRIBUTING TO CHILD ABUSE AND NEGLECT 199, 199-202 (Robert T. Ammerman & Michel Hersen eds., 1990) [hereinafter CHILDREN AT RISK]; DAVID A. WOLFE, CHILD ABUSE: IMPLICATIONS FOR CHILD DEVELOPMENT AND PSYCHOPATHOLOGY 44-68 (1987). The first three of these models are the most traditional. *See also* THEORIES OF CHILD ABUSE AND NEGLECT: DIFFERENTIAL PERSPECTIVES, SUMMARIES, AND EVALUATIONS (Oliver C.S. Tzeng et al. eds., 1991) (grouping 46 separate theoretical viewpoints into nine paradigms). The child abuse theories can, of course, be sorted in a variety of different ways.

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some abusive individuals, in a broader psychodynamic dysfunction, such as parental psychiatric disturbance or mental illness.

Although none of the theories subsumed under this four-model framework attempts to explain every instance of child abuse, each makes a serious effort to make some sense of the phenomenon. Each identifies environmental factors seemingly correlated with the incidence of abuse and then posits plausible processes by which those factors, in dynamic combination, may increase the risk of abusive behavior. While demonstrably helpful, however, these theories, like prevailing theories in most other contexts, must be susceptible of useful improvement. For although they identify factors that descriptively *are* associated with abuse, they have not adequately explained why *those* factors, and not others, correlate positively with the behavior. Moreover, the theories generally lack a sound foundation in the processes by which the human brain (as an evolved processor of social information) and human behavior (which on average reflects the non-random patterns of that processing) developed over time. In my view, then, the theories are necessarily incomplete. Although they vary in particulars, each essentially locates *all* influences of significance to child abuse within the present tense environmental boundaries of an abusive individual's lifetime.

This common feature stands in sharp contrast to that of any evolutionary perspectives, since the latter always expand the time frame in which significant effects on studied behavior can be located. In the vast span of evolutionary time, for instance, we might anticipate that natural selection would have operated very powerfully upon behavioral predispositions that influence the manner in which organisms treat juveniles—since generating offspring and contributing toward their eventual reproduction represents one of the principal processes by which genes replicate themselves.[22] This fact suggests that behaviors affecting the treatment of juveniles (such as neglecting, abusing, or killing them, as well as aggressively protecting them from these acts) are paradigmatically topics on which an evolutionary analysis could likely provide great insight.

In the second stage of evolutionary analysis in law, *The Information Stage*, we turn to explore evolutionary theories in detail, and, consistent with scientific method, compare the falsifiable predictions of those theories with empirical evidence. More specifically, in this stage of the analysis we ask the following questions: 1) What are the relevant evolutionary theories and predictions?; 2) What empirical evidence bears on those predictions?; 3) How does the evidence fit the predictions?; 4) Do the theories apply to humans?; and 5) Should the theories be considered in legal analysis and policy-making?

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22. *See generally* JOHN ALCOCK, ANIMAL BEHAVIOR (5th ed. 1993); DOUGLAS J. FUTUYMA, EVOLUTIONARY BIOLOGY (2d ed. 1986). A brief overview for lawyers of evolutionary principles appears at Jones, *supra* note 16, at Part I.

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There is no neat correlation in the study of animal behavior, of course, to the study within traditional sociology or psychology of child abuse. Instead, evolutionary biologists and evolutionary psychologists have tended to focus on behavioral patterns in parental care generally, rather than on some notion of "juvenile abuse" *per se* (whatever "abuse" would mean in the non-human context). Nevertheless, some behaviors relevant to the study of parental care clearly overlap with those we call child abuse in the human context, and these are useful for comparison purposes.

Briefly, the fields of evolutionary biology and evolutionary psychology maintain well-developed theories, supported by a great number of empirical studies, regarding circumstances in which adult animals of species that exhibit parental care for offspring would behave in ways tending to cause injury or death to juveniles of their own species (either directly, as by attack, or indirectly, as by a reduction in provided resources). One subset of these theories focuses on infanticidal behavior. Because the unambiguous reality of death obviates interpretive arguments over relative quality of parental care, and relative effects of varying parental care, this subset of "abusive" behaviors is worth careful examination; it provides a good test case of an evolutionary theory's robustness. And should such a theory prove robust, it is a relatively simple matter to consider how it may shed light on the larger context of parental care generally, as well as on the particular context of various child-harming activities of humans.[23]

There are at least two evolutionary theories that link juvenile deaths to evolved behavior.[24] When considering these, it is important to remember that making such a link does not require that every behavioral manifestation of evolved predispositions, in this case a juvenile's death, be directly advantageous to the actor. Rather it is enough, in order for a behavioral predisposition to have evolved, that the predisposition will, *on average* and across *all* encountered contexts, lead to increases in the inclusive fitness of the organisms bearing it.

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23. *But see* Richard J. Gelles, *Physical Violence, Child Abuse, and Child Homicide: A Continuum of Violence, or Distinct Behaviors?*, 2 HUM. NATURE 59 (1991) [hereinafter *A Continuum of Violence?*] (suggesting that infanticide and non-fatal abuse may be discontinuous).

24. There is a massive theoretical and empirical literature on infanticide, and I cannot provide any but the most cursory description of it here. My purpose, once again, is not to establish whether these evolutionary theories are robust, but rather to explore what we might do with them if they are. Thus far, the majority of biologists who have studied the issue find that the data fit these theories quite compellingly. *See, e.g.*, INFANTICIDE & PARENTAL CARE (Stefano Parmigiani & Frederick S. vom Saal eds., 1994); INFANTICIDE: COMPARATIVE AND EVOLUTIONARY PERSPECTIVES 43 (Glen Hausfater & Sarah Blaffer Hrdy eds., 1984); and sources cited in Jones, *supra* note 16.

The earliest elaboration and classification of evolutionary theories on infanticide is Sarah Blaffer Hrdy, *Infanticide Among Animals: A Review, Classification, and Examination of The Implications for The Reproductive Strategies of Females*, 1 ETHOL. & SOCIOBIOL. 13 (1979). Hrdy identified four theories of adaptive infanticidal behavior, two of which (concerning fatal exploitation of infants as a resource and infanticide incident to competition for resources) are not relevant here. I refer to the two that are relevant by different names than appeared in the original only to avoid confusion among non-biologists.

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According to the first theory, given its most powerful articulation by evolutionary psychologists Martin Daly and Margo Wilson, some juvenile deaths are the by-product of an evolved, generally adaptive, psychological mechanism known as "discriminative parental solicitude" (or "DPS"). This mechanism is believed to facilitate the delivery of finite parental resources to those individuals most capable of turning the investment of such resources into parental reproductive success.[25] Natural selection would inevitably favor such a mechanism, once it arose, because it would better optimize inclusive fitness returns than would indiscriminate investment of the same resources.[26] If such a mechanism exists, one would expect to see individuals biasing their resources toward kin compared to non-kin (in patterns sensitive to probable degrees of relatedness).[27] One would also expect to see individuals biasing their resources among kin equally related to them (such as offspring) in patterns sensitive to observable attributes of the offspring (such as health, size, or deformity) that predict its eventual ability to translate parental investment into subsequent reproductive success[28] —and also sensitive to probable payoffs from contributing the same parental investment to alternative loci (such as to future offspring).[29]

There are thus two ways DPS, as an information-processing mechanism of an evolved psychology, could contribute to the incidence of juvenile deaths. First, a juvenile dependent on an *unrelated* adult would be statistically more likely to die of neglect or to be killed by that adult, than would an offspring of the same adult. This is because the infant would not, on average, evoke the same solicitousness as would an offspring of that adult, and because the adult will therefore, on average, be less tolerant, less willing to provide, and less protective of the infant than would be that infant's own parent. From this perspective, a child may be

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25. For more on the subject of this paragraph, see Martin Daly & Margo Wilson, *Discriminative Parental Solicitude and the Relevance of Evolutionary Models to the Analysis of Motivational Systems, in* THE COGNITIVE NEUROSCIENCES 1269 (Michael Gazzaniga ed., 1995) [hereinafter *Discriminative Parental Solicitude*]; MARTIN DALY & MARGO WILSON, HOMICIDE 42-43 (1988); Martin Daly & Margo Wilson, *Evolutionary Social Psychology and Family Homicide,* 242 SCIENCE 519 (1988) [hereinafter *Evolutionary Social Psychology*] (concerning confirmations of DPS predictions in many empirical studies); Robert L. Trivers, *Parent-Offspring Conflict,* 14 AM. ZOOL. 249 (1974).

26. *See generally* Trivers, *supra* note 25.

27. Martin Daly & Margo I. Wilson, *Abuse and Neglect of Children in Evolutionary Perspective, in* NATURAL SELECTION AND SOCIAL BEHAVIOR 405 (Richard D. Alexander & Donald W. Tinkle eds., 1981). Natural selection effectively penalizes a propensity to squander parental resources on non-kin. Parents that allocate a substantial proportion of their investment to non-kin will transmit fewer copies of their own genes into future generations than will parents that discriminate against non-kin in their provision of resources.

28. *See* Martin Daly & Margo I. Wilson, *Child Maltreatment from a Sociobiological Perspective, in* DEVELOPMENTAL PERSPECTIVES ON CHILD MALTREATMENT 93 (Ross Rizley & Dante Cicchetti eds., 1981). See also Margo Wilson & Martin Daly, *The Psychology of Parenting in Evolutionary Perspective and the Case of Human Filicide, in* INFANTICIDE & PARENTAL CARE, *supra* note 24, at 73; HOMICIDE, *supra* note 25, each source building on the work of RICHARD ALEXANDER, DARWINISM AND HUMAN AFFAIRS 109 (1979).

29. *See generally Discriminative Parental Solicitude, supra* note 25.

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at increased risk of death not because it is affirmatively *adaptive* for the parent to kill him, but as a byproduct of the fact that natural selection has left the adult without any evolved psychological mechanisms prompting him or her to devote to *unrelated* juveniles the same extraordinary care that protects *related* children from life's encounters and lavishes upon them the resources necessary to their own survival and eventual reproduction.

Second, a juvenile exhibiting traits predictive of a *low RS return* on parental investment (compared to the probable payoff from investment elsewhere) would be statistically more likely to die of neglect, abandonment, or infliction of fatal injury, even if genetically related to the resource-provider.[30] Natural selection will simply favor genetically-influenced behaviors, expressed in adults, that reduced parental investment in a particular offspring toward zero as the offspring's probable contribution to parental reproductive success approached zero—and as the benefits of redirecting parental investment toward that offspring's existing or future sibling were likely to be greater than the benefits of its own continued support. For even though offspring are principal vehicles for increasing parental reproductive success, the allocation of parental resources that best maximizes a *parent's* inclusive fitness returns does not necessarily maximize that of a particular offspring.[31] DPS can, for example, increase the reproductive success of animal parents by predisposing them to allocate more resources to a more-promising offspring at the expense of a less-promising one (or indeed to abandon offspring evidencing cues of infirmity) and to invest elsewhere, such as in future offspring, the resources thereby released.

The logic of the DPS theory of juvenile harm generates a number of specific and falsifiable predictions about non-random patterns of age, sex, birth order, inter-birth interval, and prior health indicators of dead juveniles, as well as the ages of homicidal mothers, and the relative amounts of resources available to homicidal parent(s), that would be observable if an evolved human psychology manifested discriminative parental solicitude.[32] For example, children unrelated to a parent, children born physically or mentally handicapped, children born to parents with few resources, and children born after numerous prior siblings would be at increased risk of abuse.

The Reproductive Access theory is the second evolutionary theory that links juvenile deaths to evolved behavior. It attributes some of those deaths to an evolved, generally adaptive psychological mechanism in the males of many species that nurse their young. In such a species there is

30. *See* Martin Daly, *Parent-Offspring Conflict and Violence in Evolutionary Perspective, in* SOCIOBIOLOGY AND THE SOCIAL SCIENCES 25 (Robert Bell & Nancy Bell eds., 1989).
31. *See* Trivers, *supra* note 25; Wilson & Daly, *supra* note 28.
32. *See generally* Daly, *supra* note 30.

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typically a contraceptive effect to nursing (which appears to adaptively regulate the inter-birth interval, which might otherwise be so short as to be suboptimal for raising each of numerous infants to independence).[33] Because the cessation of nursing brings a female back into estrus far earlier than if an infant nurses to weaning age, natural selection would inevitably favor any heritable psychological mechanism predisposing a male to eliminate unrelated, unweaned infants of females with whom he might mate. Such *selective* infanticide would shorten each female's inter-birth interval and increase the probability that the male can garner faster access to her reproductive capabilities and thereby earlier commence his own gene replication through her.[34]

Like the DPS theory, this Reproductive Access theory of juvenile harm also generates a number of specific and falsifiable predictions about non-random patterns of weaning status of dead juveniles, relatedness of juvenile to infanticidal male, period of infanticidal male's access to juvenile's mother, probability of infanticidal male actually impregnating juvenile's mother, and the presence of evolved female counterstrategies to prevent potentially infanticidal males from killing their infants, that would likely be observable if an evolved human psychology reflected such an adaptation. The theory predicts, for example, that children will be at greater risk of death or abuse in a home with a stepfather than in one without, and that risk would be heavily biased toward children in the nursing years.

Now although it is not yet widely known outside evolutionary biology circles, an extraordinarily broad and deep body of theoretical and empirical work has revealed powerful evidence that across a wide variety of species these two theories' predictions tightly, sometimes almost incredibly tightly, match observable reality.[35] A few representative examples, from among the voluminous studies:

- In numerous bird species, parents actively eliminate the one chick of two or more that has the poorest survival prospects.[36]

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33. This temporary contraceptive effect is known as *lactational amenorrhea*. R.D. Martin, *Phylogenetic Aspects of Primate Reproduction: The Context of Advanced Maternal Care, in* MOTHERHOOD IN HUMAN AND NONHUMAN PRIMATES: BIOSOCIAL DETERMINANTS 16 (C.R. Pryce et al. eds., 1994). The effect is operative in humans. *Id.* at 25; Audrey E. Rosner & Susan K. Schulman, *Birth Interval Among Breast-Feeding Women Not Using Contraceptives*, 86 PEDIATRICS 747 (November 1990); ELAINE MORGAN, THE DESCENT OF THE CHILD: HUMAN EVOLUTION FROM A NEW PERSPECTIVE 83 (1994).

34. *See* Glenn Hausfater, *Infanticide in Langurs: Strategies, Counterstrategies, and Parameter Values, in* INFANTICIDE: COMPARATIVE AND EVOLUTIONARY PERSPECTIVES, *supra* note 24, at 257.

35. *See, e.g.*, INFANTICIDE & PARENTAL CARE, *supra* note 24; INFANTICIDE: COMPARATIVE AND EVOLUTIONARY PERSPECTIVES, *supra* note 24.

36. L. Scott Forbes & Douglas W. Mock, *Proximate and Ultimate Determinants of Avian Brood Reduction, in* INFANTICIDE & PARENTAL CARE, *supra* note 24, at 237, 238 (surveying the literature). The likelihood of infanticide is inversely correlated with the availability of resources. *Id.*

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• In many rodent species, intruding males generally kill all unrelated young at any opportunity.[37] Significantly, the infanticidal behavior typically correlates closely with the female reproductive cycle, diminishing precisely one gestation period after the male's ejaculation. It reemerges after a period precisely equivalent to that of the female's birth-to-weaning interval (when the male's own offspring might be present).[38]

• In lions, newly dominant males routinely kill every unweaned cub present at the time of their takeover (except during takeovers of prides whose members are closely related to them).[39] Infanticide by male lions accounts for nearly 25% of all deaths of nursing cubs (with the risk to a cub of being killed declining rapidly with age).[40] Although the composition of males in a pride changes periodically, all surviving cubs in a pride have been sired by the resident males.[41] Females exhibit male-specific behavior that reduces the risk of infanticide.

• In primates, it is widely accepted that infanticide: 1) is committed almost exclusively by adult males unrelated to the killed infant; 2) almost exclusively targets unweaned infants; 3) is almost exclusively committed by newly dominant adult males; 4) prompts the mother of a killed infant to resume sexual receptivity within days or weeks (significantly more quickly than if the infant survived); 5) usually results in the killing male siring the next offspring of the female whose infant he killed; 6) is not confined to high-density populations or to animals living in disturbed habitat; and 7) can be predictably provoked (in the experimental context) by removing a group's dominant male.[42]

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37. *See generally* U. William Huck, *Infanticide and the Evolution of Pregnancy Block in Rodents, in* INFANTICIDE: COMPARATIVE AND EVOLUTIONARY PERSPECTIVES, *supra* note 24, at 349, 354 (citing Huck et al., *Infanticide in Male Laboratory Mice: Effects of Social Status, Prior Sexual Experience, and Basis for Discrimination between Related and Unrelated Young*, 30 ANIM. BEHAV. 1158 (1982) (one-half of males killed unrelated pups, while only one-fifteenth of males killed their own pups)); Robert W. Elwood & Hazel F. Kennedy, *Selective Allocation of Parental and Infanticidal Responses in Rodents: A Review of Mechanisms, in* INFANTICIDE & PARENTAL CARE, *supra* note 24, at 397; Glenn Perrigo & Frederick S. vom Saal, *Behavioral Cycles and the Neural Timing of Infanticide and Parental Behavior in Male House Mice, in* INFANTICIDE & PARENTAL CARE, *supra* note 24, at 365.

38. *See, e.g.*, Perrigo & vom Saal, *supra* note 37, at 365, 366; Frederick S. vom Saal, *Proximate and Ultimate Causes of Infanticide and Parental Behavior in Male House Mice, in* INFANTICIDE: COMPARATIVE AND EVOLUTIONARY PERSPECTIVES, *supra* note 24, at 401.

39. *See* Anne E. Pusey & Craig Packer, *Infanticide in Lions: Consequences and Counterstrategies, in* INFANTICIDE & PARENTAL CARE, *supra* note 24, at 277, 279-80 (unrelated adult males and subadults are generally evicted). A nursing female cannot conceive before her cubs reach 18 months of age. Should her cubs die, however, she becomes sexually receptive within days. It has been estimated that by killing small cubs intruding males could sire their own cubs eight months earlier, on average, than if they spared them. *Id.*

40. *Id.* (describing findings based on DNA analyses).

41. Dennis A. Gilbert et al., *Analytical DNA Fingerprinting in Lions: Parentage, Genetic Diversity, and Kinship*, 82 J. HERED. 378 (1991).

42. During a two-decade study of 1000 langur monkeys, for example, males invading a breeding group killed nearly 30% of all infants born within the troop. At least 95% of the time those males killed unrelated infants, and at least 75% of the time the infanticidal male succeeded in siring subsequent offspring with the victim's mother, following a significantly shortened interbirth interval.

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Those most qualified to review this evidence find it compelling, and the DPS and Reproductive Access theories are therefore relatively uncontroversial. Indeed, each now appears in major textbooks on evolved animal behavior.[43]

But most significantly for our purposes, the patterns that emerge in *human* populations conform rather precisely to patterns predicted by the DPS and Reproductive Access theories and observable in other animal species.[44] For example, human children most at risk of abuse are those with birth defects, in families with scarce resources, later in birth order, or in homes with unrelated males.[45] Indeed, children in the United States under two years old are about *100 times* more at risk of lethal abuse at the hands of stepparents than of genetic parents.[46] And despite numerous attempts to distinguish these results,[47] no other known variable, such as economic class, appears as strongly correlated to this pattern.[48] More-

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See Sarah Blaffer Hrdy et al., *Infanticide: Let's Not Throw Out the Baby With the Bathwater*, 3 EVO. ANTHRO. 151 (1994/95).

43. *See, e.g.*, ALCOCK, *supra* note 22, at 2-6; J.R. KREBS & N.B. DAVIES, AN INTRODUCTION TO BEHAVIOURAL ECOLOGY 4-10 (1993); ROBERT TRIVERS, SOCIAL EVOLUTION (1985).

44. *See* INFANTICIDE & PARENTAL CARE, *supra* note 24, chs. 1-5; INFANTICIDE: COMPARATIVE AND EVOLUTIONARY PERSPECTIVES, *supra* note 24, chs. 22-25; and Jones, *supra* note 16, at Part II.B.2.c (surveying literature on patterns in human infanticide).

45. Sarah Blaffer Hrdy & Glenn Hausfater, *Comparative and Evolutionary Perspectives on Infanticide: Introduction and Overview* [hereinafter *Comparative and Evolutionary Perspectives on Infanticide*], *in* INFANTICIDE: COMPARATIVE AND EVOLUTIONARY PERSPECTIVES, *supra* note 24, at xxxi.

46. *Evolutionary Social Psychology*, *supra* note 25, at 520; HOMICIDE, *supra* note 25, at 89. *See* Martin Daly & Margo Wilson, *Child Abuse Risk and Household Composition in Hamilton*, 31 J. ONTARIO ASSOC. CHILDREN'S AID SOCIETIES 11, 11-12 (1986) [hereinafter *Child Abuse Risk and Household Composition*]; Martin Daly & Margo Wilson, *Child Abuse and Other Risks of Not Living With Both Parents*, 6 ETHOL. & SOCIOBIOL. 197, 205 & 202 Fig. 1 (1985) [hereinafter *Child Abuse and Other Risks*]. Subsequent studies consistently find dramatically elevated risk for children living with substitute parents. *Evolutionary Social Psychology*, *supra* note 25 (70 times greater in Canada); *Discriminative Parental Solicitude*, *supra* note 25; Martin Daly & Margo I. Wilson, *Some Differential Attributes of Lethal Assaults on Small Children by Stepfathers versus Genetic Fathers*, 15 ETHOL. & SOCIOBIOL. 207, 210 (1994) [hereinafter *Differential Attributes*] (60 times greater in Canada). *See also* Martin Daly & Margo Wilson, *Children as Homicide Victims*, *in* BIOSOCIAL DIMENSIONS, *supra* note 20, at 201; *Evolutionary Social Psychology*, *supra* note 25, at 520. These results are consistent with studies in other countries, which have also found an increased risk of lethal and sublethal abuse to children living with at least one substitute parent. *See, e.g.*, Susan J. Creighton, *An Epidemiological Study of Abused Children and Their Families in the United Kingdom Between 1977 and 1982*, 9 CHILD ABUSE AND NEGLECT 441 (1985); J. Wadsworth et al., *Family Type and Accidents in Preschool Children*, 37 J. EPIDEM. & COMMUN. HEALTH 100 (1983); P.D. Scott, *Fatal Battered Baby Cases*, 13 MED., SCI. & L. 197 (1973); D.M. FERGUSSON ET AL., CHILD ABUSE IN NEW ZEALAND (1972); Daly & Wilson, *supra* note 27.

47. *See, e.g.*, *A Continuum of Violence?*, *supra* note 23; Glenn D. Wolfner & Richard J. Gelles, *A Profile of Violence Toward Children: A National Study*, 17 CHILD ABUSE & NEGLECT 197 (1993). Replying, *see* Martin Daly & Margo Wilson, *A Reply To Gelles: Stepchildren Are Disproportionately Abused, And Diverse Forms Of Violence Can Share Causal Factors*, 2 HUM. NATURE 419, 421-22 (1991).

48. A number of variables possibly confounding the significance of this conclusion were proposed, both by the authors and by others. *See, e.g.*, Martin Daly et al., *Household Composition and the Risk of Child Abuse and Neglect*, 12 J. BIOSOC. SCI. 333 (1980); *Child Abuse and Other Risks*, *supra* note 46; Martin Daly & Margo Wilson, *Risk of Maltreatment of Children Living With Stepparents*, *in* BIOSOCIAL DIMENSIONS, *supra* note 20, at 215; *Child Abuse Risk and Household Composition*, *supra*

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over, research reveals that stepfathers not only kill children at higher rates than genetic fathers, but they also kill them in different ways and for different reasons.[49] They are, for example, about 120 times more likely to beat a child to death than is a homicidal genetic father.[50]

A reportedly tight fit between theory and data during this *Information Stage* of evolutionary analysis does not, of course, automatically make applicable in the human context any theory apparently applicable in the non-human context. Independent causal processes can often lead to similar results. So assessing the relative probable applicabilities of different evolutionary theories to the human context will always depend, in part, on a careful and intelligent evaluation of potentially distinguishing differences between evolution of the human species and that of other species.

For example, both the DPS and Reproductive Access theories predict that, all else being equal, adults unrelated to an infant will be more likely, per capita, to neglect, injure, or kill an infant than would be an adult related to the infant. The former theory predicts this because natural selection is very unlikely to have produced an evolved psychological predisposition to treat unrelated juveniles as solicitously as related juveniles. The latter theory predicts this because natural selection would favor even the slightest predisposition to selectively eliminate unweaned infants dependant on a potential mate, if such infanticide tended to increase the access of an infanticidal male to the reproductive resources of the infant's mother, compared to the access to her of males that are not infanticidal. And yet researchers currently conclude that patterns of child death and abuse in human populations are more likely to be a product of DPS than of a psychological mechanism reflecting an adaptive predisposition to context-specific selective infanticide. The Reproductive Access theory is expected to have greatest selective advantage in, and indeed appears to be most prominent in, species reflecting harem-style monopolization of breeding females by a few males, and relatively short tenure of such males in such status.[51] Since in human populations these conditions appear never to have been as prevalent as they now are in some related

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note 46; Richard J. Gelles & John W. Harrop, *The Risk of Abusive Violence Among Children With Nongenetic Caretakers*, 40 FAM. REL. 78 (1991). These included such things as the well-known relationship between decreased income and increased risk of abuse, as well as family size, reporting bias, detection bias, duration of co-residency, maternal youth, and the like. Each potential confound was considered and rejected in the principal, as well as subsequent, studies. *See, e.g.*, Daly & Wilson, *Risk of Maltreatment of Children Living With Stepparents*, *in* BIOSOCIAL DIMENSIONS, *supra* note 20, at 215, 225-26. Alternative hypotheses fail, for example, to explain why abusive stepparents appear to differentially abuse unrelated children in the house when sparing their own children in the house. J.L. Lightcap et al., *Child Abuse: A Test of Some Predictions from Evolutionary Theory*, 3 ETHOL. & SOCIOBIOL. 17 (1981).

49. *Differential Attributes*, *supra* note 46, at 216.

50. *Id.* at 211.

51. *See, e.g.*, Richard D. Alexander, *The View From the President's Window*, 4 HUM. BEHAV. & EVOL. SOC'Y NEWSLETTER 2 (No. 2, Sept. 1995).

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primates that practice infanticide, the Reproductive Access theory is expected to have commensurately less applicability than the DPS theory in the human context.[52]

Should a seemingly robust evolutionary theory, like the DPS theory, that appears to have currency in the human context, be included with that mass of theories and information that policy-makers should consider when assessing how law can best leverage against an appropriate behavioral model? Elsewhere I have argued that a rebuttable presumption of inclusion is the most appropriate presumption in this context.[53] In the case of the DPS theory of child abuse, employing that presumption will facilitate our consideration of the truly integrative aspects of this proposed method for conducting evolutionary analysis in law.

III. EVOLUTIONARY ANALYSIS IN LAW: THE INTEGRATIVE PROCESS

In Part II we began to explore how evolutionary analysis might lead to a more usefully integrated model for understanding child abuse. Specifically, we traced how, during the *Identification* and *Information* stages of that analysis, we might preliminarily evaluate whether an evolutionary approach was worth pursuing and then, if it seemed so, separately consider the prevailing and evolutionary theories about the many influences contributing to abusive behavior. This also entailed comparing predictions of theories with facts, assessing the applicability of bio-behavioral theories to humans, and deciding whether seemingly robust theories should inform legal analysis and policy-making.

We come, then, to the main focus of our inquiry here—to *The Integration Stage*. In this stage one tries to extract some coherent, law-useful model that might connect prevailing theories on the socio-cultural causes of child abuse, evolutionary theories about the evolved psychology of parental care, and the many bits of data from non-human and human animals that reveal patterns in infant-killing and abuse. Simply assume, for the purposes of exploring this integrative process, that the foregoing stages have led us to the point where evolutionary theory concerning behavior harmful to juveniles, which posits an evolved discriminative parental solicitude, has been deemed sufficiently robust to be considered during policy-making processes with that mass of other seemingly robust theories about the causes of child abuse. Attempting to integrate prevailing and evolutionary theories, the most challenging aspect of

52. Of course, when trying to decide whether theories of demonstrated robustness are applicable to explain behavior patterns in humans that are the same as those elsewhere in the animal kingdom, it is alleged human difference from the rest of the animal kingdom, not sameness with it, that requires argument with particularity. Dispassionate, non-anthropocentric evaluation of the applicability of such a theory to humans requires a rebuttable presumption of applicability rather than of non-applicability.

53. *See* Jones, *supra* note 16, at Part II.B.5.

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evolutionary analysis in law, requires that we first discover where, if anywhere, prevailing and evolutionary theories conflict.

A. *Isolating Conflicts*

One way to isolate conflicts is to look separately for differences between fundamental theoretical substructures, on one hand, and differences between predictions generated by the theories, on the other. Although conflicts in either of these two contexts would be significant, the manners in which they arise differ in ways relevant to integrative efforts.

Differences between the theoretical substructures of the prevailing and evolutionary theories are likely to be of two kinds: 1) differences in the levels of analysis; and 2) differences in basic assumptions. Typically, prevailing theories operate at what biologists term the level of *proximate* causation. Proximate causes (similar but not identical to proximate causes in law) describe the immediate causes—the "hows" of behavior—that for instance explain how environmental conditions prompt internal processes that in turn lead an organism to manifest a particular behavior. Evolutionary theories, on the other hand, operate at what biologists term the level of *ultimate* causation. Ultimate causes describe evolutionary processes—the "whys" of behavior—that explain why a behavior came to be commonly observable in a given species. Causes at this level of analysis are typically understood in terms of the reproductive consequences of behavior.[54]

An example may help to clarify how a given behavior can be understood both in terms of proximate and ultimate causation. Male frogs of many species, such as the tellingly-named spring peeper, croak in the spring. In proximate terms, they croak because seasonal changes in such things as day length or wet weather trigger specific hormonal and neurochemical fluctuations that lead, eventually, to the inflation and deflation of airspaces bordered by elastic tissue. This causes air to pass through specifically shaped structures that generate sound waves of particular frequencies. In ultimate terms, widespread croaking reflects the fact that the remote ancestors of today's croaking males left more descendants than did those less predisposed to croak. To the extent that croaking helped, for example, to advertise good health and thereby both to attract mates and to defend territory, it was adaptive. And to the extent that the ability to croak and the urge to respond to certain environmental

54. For more on proximate and ultimate causation, see ALCOCK, *supra* note 22, at 2-6; John Alcock & Paul Sherman, *The Utility of the Proximate-Ultimate Dichotomy in Ethology*, 96 ETHOL. 58 (1994); GOLDSMITH, *supra* note 9, at 3-11, 46-69; Owen D. Jones, *Genes, Behavior, and Law* 15 POL. & LIFE SCIENCES 101 (1996); Bobbi S. Low, *Human Sex Differences in Behavioral Ecological Perspective*, 16 ANALYSE & KRITIK 1 (1994).

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cues with croaking were heritable, the proportion of males in successive generations that croaked inevitably increased over time until we now observe the trait to be typical of males in a given frog species.

Neither level of analysis, neither proximate nor ultimate, is complete without the other. Thus, if one were truly interested in gaining a more complete understanding of what "causes" croaking, the identification of proximate causes would be descriptive without being fully explanatory. That is, identifying proximate causes tells us exactly nothing about why wet weather rather than dry weather correlates with specific physiological changes, or why those changes yield croaking rather than one of the innumerable alternative behaviors, such as quiet motionlessness or hibernation.

This simply means that most behavior (really all behavior, in the broadest sense) is enabled by *two* distinct *kinds* of causes (as well as, on occasion, multiple causes of each kind). Proximate factors would have nothing to influence, absent senses to perceive them and an information-processing system to analyze them. Similarly, the particular combinations of sensors and processors that each species exhibits themselves evolved (at least in large part) because heritable variations in sensing and processing, in the presence of specific environmental contexts, resulted in differential reproductive success. Knowing this, anyone seeking a more complete understanding of *human* behavior, or developing or evaluating theories of causation in the human context, should understand that causes come in pairs and should, whenever studying one, look also for the other.

This of course requires that one maintain a constant self-awareness of the *kind* of causation (that is, the *level* of analysis) at which one's logic is currently operating. Lawyers (and other members of the social sciences) would be well advised to do so. Failure to recognize explicitly the existence of different levels of inquiry into the causes of law-relevant behavior often prompts an unexamined and counterproductive assumption that prevailing and evolutionary theories are incompatible—even when they may not be. For example, because they failed to recognize that prevailing and evolutionary theories of child abuse speak to causation in different levels of analysis, even the most careful child abuse authors have often mistakenly implied that largely compatible explanations are, instead, alternative ones.[55]

Evolutionary forces inevitably shaped a species-typical neural architecture that non-randomly generates psychological states. These, in turn and on average, predispose individuals to behave in patterned ways in response to certain kinds of encountered environmental conditions. Thus, *every* study of ultimate causation will point toward proximate, environmental

55. *See, e.g.*, Marilyn Coleman, *Stepfamilies in the United States: Challenging Biased Assumptions*, *in* STEPFAMILIES: WHO BENEFITS? WHO DOES NOT? (Alan Booth & Judy Dunn eds., 1994) (attacking invocation of evolutionary theories of stepparent mistreatment of stepchildren).

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causes (some of which may have already been identified by careful social science observation). Not only do evolutionary causes not compete with developmental or environmental causes, they in fact require them.

For example, evolutionary theory makes obvious that it will become powerfully maladaptive for an organism to treat non-kin and kin alike for all purposes as soon as another organism manifests a heritable predisposition to favor his relatives. But it is only through a psychological state, evoking discriminative parental solicitude as a function of proximate conditions (such as those providing relatedness cues, or those providing cues to the relative probable contribution to reproductive success that this infant can make given the parent's available resources) that the logic of adaptation can be vindicated. Consequently, it will often be advantageous to begin integrative efforts by identifying differences between prevailing and evolutionary theories in levels of analysis, so as not too quickly to conclude that the theories conflict.

The basic assumptions of prevailing and evolutionary theories offer more fertile ground for discovering true conflicts. Yet here, too, apparent conflicts can be false conflicts. For example, traditional social science theories often differ from evolutionary theories by implicitly or explicitly presupposing that significant (or at least most law-relevant) human behavior is unaffected by human evolutionary history. Whether this assumption is found in the deafening silence of non-talk about evolved behavior, or in straw-man attacks on supposed genetic determinism, it typically denies that there is any evolved human psychology worth noting—beyond the raw capacity to reason. Evolutionary theories, in contrast, assume that evolutionary processes can, and indeed do, through the relentless effects of natural selection on the persistence and distribution of gene combinations, importantly influence human nature and thus human behavior. (While it is not the province of evolutionary biologists to try to *locate* precise gene combinations that influence behaviors, it is fundamental to their discipline that such combinations be capable of influencing behaviors.)

When assessing the extent to which prevailing and evolutionary theories are compatible, of course, this difference between basic assumptions will be most relevant only if the assumptions lead to an unavoidable conflict between the theories. An unavoidable conflict, by definition, must be one resulting from at least two assumptions that are at once both necessary to each theory and mutually exclusive (i.e., incapable of simultaneous truth).

Of course, the very process of ascribing "necessary" and "mutually exclusive" status to foundational assumptions is fraught with traps. To be meaningful, these must be objective rather than subjective designations. And this requires a skeptical view even of works emanating from the prevailing and evolutionary traditions. Given pre-existing disciplinary divisions, subjective perceptions of conflict between them may reflect the artificial dualism earlier referenced. For example, an uncritical eye might

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allow to pass unchallenged such seemingly common bootstrapping logic as this:

- Either a particular behavior is learned or it is caused by genes;
- We can demonstrate that this behavior can be learned;
- Therefore genes do not significantly influence the incidence of that behavior.

Here, the conclusion might itself appear to be an assumption basic to the behavioral theory. In reality, it only follows from the prior assumption that genetic and environmental explanations of the behavior are alternative. In such a case, an apparent conflict about the influence of genes on behavior is only a false conflict, posing no significant obstacle to disciplinary and theoretical integration. The perception of conflict reflects misapprehension of the biology of behavior.

To illustrate: the standard social science model scholarship on the causes of child abuse makes scant reference to evolutionary influences upon diverse child-rearing behaviors.[56] The few references one can uncover are almost universally dismissive—typically misstating, before then rejecting, evolutionary propositions.[57] While there are a small number of scholars in sociology and related disciplines who have moved to consider more holistic, biosocial perspectives on child abuse,[58] the vast bulk of the child abuse literature still reads as if Darwin never lived, Daly & Wilson never wrote, and acknowledging any significant evolutionary influences on trends in abusive behavior would eviscerate favorite social science theories. A *lack* of evolutionary and genetic influences on behavior, it seems, is a basic—though in fairness often unexamined—assumption of popular child abuse models.

Logically, however, we might consider the assumption that child abuse is unaffected by human genetic substructures to be a function of exclusionary bias, rather than an exclusionary necessity.[59] That is, while many social science theorists may assert or imply that their theories

56. *See, e.g.*, CHILDREN AT RISK, *supra* note 21.

57. *See, e.g.*, UNDERSTANDING CHILD ABUSE AND NEGLECT, Panel on Research on Child Abuse and Neglect, Commission on Behavioral and Social Sciences and Education, National Research Council 122 (1993) [hereinafter UNDERSTANDING CHILD ABUSE AND NEGLECT]. The Panel dismissed the significance of evolutionary perspectives after characterizing them as concerned with mechanisms designed "to enhance the chances of survival of the species." It would be difficult to misstate evolutionary theory by a wider margin. *See generally* Jones, *supra* note 16 (providing an overview of the basic principles of modern evolutionary theory and their application to parent-offspring conflicts).

58. Richard Gelles, David Popenoe, Robert L. Burgess, and James Garbarino are examples. *See, e.g.*, Michael T. McGuire & Richard Gelles, *Family Violence, Evolutionary Biology, and the Law*, *in* GEWALT IN DER KLEINGRUPPE UND DAS RECHT, 3 FESTSCHRIFT MARTIN USTERI, SCHRIFTEN ZUR RECHTSPSYCHOLOGIE (forthcoming 1997); DAVID POPENOE, LIFE WITHOUT FATHER (1996); Robert L. Burgess & James Garbarino, *Doing What Comes Naturally?: An Evolutionary Perspective on Child Abuse*, *in* THE DARK SIDE OF FAMILIES 88 (Finkelhor et al. eds., 1983).

59. *See* Jones, *supra* note 16, at Part II.C.1.

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depend on a lack of evolved behavioral predispositions, it is not necessary, to their theory that abuse is caused by social stressors, for example, that there be no evolved predisposition of the human psychology to find particular kinds of stimuli stressful. In contrast, it is critically necessary to evolutionary theories, and in a way qualitatively different, that genes are capable of influencing human behavior in important ways, and are incessantly pruned by natural selection. But, even so, this difference between prevailing and evolutionary theories is a false conflict only. As when evaluating differences between prevailing and evolutionary theories at their levels of analysis, then, we must similarly not be too quick to find conflict among differences in their basic assumptions.

Of course, should we identify true conflicts between basic assumptions, we may use them to help us locate eventual conflicts between the predictions of prevailing and evolutionary theories, to which effort we would next need to turn, in any event. For the process of identifying differences relevant to the integrative process requires that we simply compare the theories' respective predictions one to another, with requisite scrutiny of their particularity, as well as their overlaps and disjunctions. Nevertheless, even theories that differ markedly in their particulars may generate the same predictions, generate overlapping predictions that are not in conflict, generate overlapping predictions where the overlapped predictions are identical, or generate one set of predictions that subsumes the other set and extends to more besides.[60]

For example, the prevailing theories on child abuse predict that a wide variety of environmental conditions known to be "stressful" will increase the risk of child abuse. These include, for example, poverty, parental youth or immaturity, unemployment, substance abuse, single-parent status, child handicap, unusual family composition, and so on. The evolutionary theories also predict that these conditions will be positively associated with child abuse, since each of these factors would likely have had a direct bearing on the probability, during any given ancestral human environment of evolutionary adaptation, that any given child would contribute substantially to parental reproductive success—and since an evolved psychology would therefore likely be powerfully alert to their presence. Despite first impression on encountering the two kinds of theories, these predictions are therefore not in direct conflict.

This remains true even though the predictions of the evolutionary theories are in some cases more specific, reflecting the premise that the human brain has evolved to weight *some* of these factors more heavily than others when it processes information. For example, DPS theory predicts that lack of genetic relationship between adult and child is

60. Prevailing theories (and less commonly evolutionary theories) do not always enumerate their predictions in ways facilitating direct comparison. Such cases require attempts to articulate predictions from logic alone, or to redefine existing predictions in terms common to both theories.

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expected to be a far *more* significant predictor of child maltreatment than, for example, single-parent status (each among relevant population samples). But while greater specificity of either evolutionary or prevailing theories can suggest that one or the other contributes more toward an ability to accurately predict patterns of behavior, greater specificity of one cannot alone yield conflict sufficient to significantly impede integration of the theories.

The very process of looking for any differences between prevailing and evolutionary theories (either in their theoretical substructures or in their predictions) that might sufficiently conflict to impede integration will often reveal a number of areas of overlap and underlying similarity that will contribute toward the process of actually integrating prevailing and evolutionary theories, to which we now turn.

B. Toward an Integrated Model

Once the differences have been identified, and the conflicts isolated, the integrative process brings the working surfaces of prevailing and evolutionary theories slowly toward each other, to see whether they can dovetail. A difference between them in their levels of analysis not only does *not* make their conceptual surfaces incompatible, but it in fact increases the likelihood that they will fit, since proximate causes and ultimate causes, in the abstract, are as compatible as two sides of a coin. Differences between the basic assumptions of the theories attributable to exclusionary bias, rather than necessity, may be ignored altogether. And differences between basic assumptions that do necessarily conflict may lead us to conflicting predictions that are akin to incompatible projections from the surfaces of the prevailing and evolutionary theories, respectively, keeping their surfaces separated.

In the latter circumstance, further integrative efforts must await studies carefully designed to test the predictions of the respective theories. One or the other may appear preferable if its predictions are more consistent with observable patterns of behavior or if it achieves the other's predictive power with fewer or otherwise simpler assumptions. Nonetheless, no weakness in a prevailing or evolutionary theory should suggest that analysis at its level, proximate or ultimate, should be abandoned. All human behavior plays against a backdrop of evolved human psychology, and human psychology affects human behavior only through proximate mechanisms.

Where evolutionary and prevailing theories do *not* conflict, one should attempt to combine their constituent knowledge systems into a seamless, integrated whole. This involves working to connect the major common features—typically by linking the proximate influences identified by the prevailing theories to the predictions of the evolutionary theories. That is:

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by demonstrating how an analysis that begins from the premise that humans share an evolved psychology can lead to the prediction that environmental factors (such as those identified by research under the auspices of prevailing theories) will be positively correlated with the behavior under study. To put it another way, one can connect common features of the theories by tracing the logic by which human information processing mechanisms (that will have evolved to incline individuals to process information in a way tending to produce behavior that would have been adaptive on average in an ancestral environment of evolutionary adaptation) will have evolved to be sensitive to certain kinds of environmental variables (some of which may have been described as somehow relevant by the prevailing theories).

To demonstrate more concretely, let's revisit the current state of affairs in more detail. Widespread child abuse has fostered widespread public concern about child abuse. Independently, the dramatically increasing proportion of stepfamilies has dramatically increased public concern about the troubles that members of stepfamilies experience—particularly stepparent-stepchild tensions. The overwhelming bulk of literature on each of these concerns makes clear that they travel in almost entirely unrelated orbits. About the only thing they appear to have in common is that the law (though not in isolation, of course) is supposed to do something about each one. The law is supposed to decrease child abuse, through interventions, punishments, and deterrents. And the law is supposed to help clarify, institutionalize, and normalize the role of stepparents in society, so that their experiences will not be inferior to those of genetic parents.[61]

Because of specialization, however, current scholarship on child abuse overwhelmingly ignores stepparents, and current scholarship on stepparents overwhelmingly ignores child abuse.[62] So legal systems not surprisingly treat each subject in isolation. For example, the great preponderance of social science studies and reporting procedures that today capture information regarding a perpetrator's relationship to an abused child simply collapse stepparents *into* the definition of parents, reflecting a perhaps unexamined assumption that distinguishing between parents and

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61. *See generally* MARGARET MAHONEY, STEPFAMILIES AND THE LAW (1994) and Margaret Mahoney, *Reformulating the Legal Definition of the Stepparent-Child Relationship*, STEPFAMILIES: WHO BENEFITS? WHO DOES NOT?, *supra* note 55, at 191 (each surveying the inconsistent legal approaches to stepparent rights and obligations in the United States); Mark A. Fine, *Social Policy Pertaining to Stepfamilies: Should Stepparents and Stepchildren Have the Option of Establishing a Legal Relationship?*, *in* STEPFAMILIES: WHO BENEFITS? WHO DOES NOT?, *supra* note 55, at 197; Gilbert A. Holmes, *The Tie That Binds: The Constitutional Right of Children to Maintain Relationships with Parent-Like Individuals*, 53 MD. L. REV. 358, 410 (1994) (arguing the law should "grant[] parent-like individuals greater consideration than the current jurisprudence affords"). *See also* Mary Ann Mason & David W. Simon, *The Ambiguous Stepparent: Federal Legislation in Search of a Model*, 29 FAM. L.Q. 445 (Fall 1995).

62. There are extremely important exceptions, of course. *See, e.g.*, sources cited *supra* note 58.

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stepparents is irrelevant to the issue of child abuse.[63] Following that lead, the procedures of state Child Protective Services (CPS) agencies (which are charged with investigating reports of child abuse, assessing the need for intervention, and supervising remedial measures) are typically unaffected by whether a reportedly abused child resides with genetic parents or stepparents.[64]

Similarly and seemingly independently, one of the most recent and comprehensive scholarly works on stepparenting contains, for example, no index listing for, or substantive discussion of, either "abuse" or "child abuse."[65] And while that work reports that more than 350 articles on various aspects of stepfamilies appeared in professional journals between 1987 and 1994, only one of those included in the 350 addressed abuse.[66] (That one, in any event, focused solely on the issue of sexual abuse and did not attempt an explanatory or theoretical analysis.) Consistent with these omissions, the general trend in law and legal scholarship is to expand rights and obligations of stepparents (in the context of support obligations, for instance) with minimal, if any, consideration of the possible effects of such policies on the incidence of child abuse.

The problem here is that law's policies about child abuse are informed by a variety of principally socio-cultural, and thus exclusively proximate, theories about the causes of child abuse. Meanwhile, law's policies about stepfamilies are informed by a variety of principally socio-cultural, and thus exclusively proximate, theories about the reasons why the stepparent-stepchild relationship exhibits various adjustment difficulties. Despite some promising headway,[67] neither the theories about child abuse nor the

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63. For example, the 1996 report of the Bureau of Justice Statistics on *Child Victimizers: Violent Offenders and Their Victims*, includes stepchildren in the definition of "Own Child" when describing victim-offender relationships. *Child Victimizers: Violent Offenders and Their Victims*, BUREAU OF JUSTICE STATS. 10 (1996). This leads to such undifferentiated conclusions as: "Nearly a third of those serving time in State prisons for violence against children had victimized their own child *or a stepchild*." *Id.* at iii (emphasis added). The U.S. Department of Health and Human Services, in a 1995 report on child abuse, defined "parent" as "the birth mother/father, adoptive mother/father, or stepmother/father of a child." U.S. DEP'T OF HEALTH & HUM. SERVS., NAT'L CTR. ON CHILD ABUSE AND NEGLECT, CHILD MALTREATMENT 1993: REPORTS FROM THE STATES TO THE NATIONAL CENTER ON CHILD ABUSE AND NEGLECT (1995). And when the Inter-Agency Council on Child Abuse and Neglect (ICAN) published the *Child Death Review Team Report for 1994*, with extremely detailed data, it nonetheless lumped genetic parents, stepparents, substitute parents, and other caretakers together. INTER-AGENCY COUNCIL ON CHILD ABUSE AND NEGLECT (ICAN) CHILD DEATH REVIEW TEAM REPORT FOR 1994. Indeed, the "Relationship of Perpetrators" Table made no distinction between mothers and stepmothers; or fathers and stepfathers. *Id.* at Table 12.

64. MARGARET M. MAHONEY, *supra* note 61, at 192-93.

65. STEPPARENTING: ISSUES IN THEORY, RESEARCH, AND PRACTICE (Kay Pasley & Marilyn Ihinger-Tallman eds. 1994) [hereinafter STEPPARENTING].

66. The work claims there were two such articles during this time period. One of these appears to have been inadvertently misattributed. The other is M. Gordon & S.J. Creighton, *Natal and Nonnatal Fathers as Sexual Abusers in the United Kingdom: A Comparative Analysis*, 50 J. MARRIAGE & FAM. 99 (1988). As nearly as I have been able to determine, none of the 23 authors contributing to STEPPARENTING cites a single one of the dozens of articles that have been written about stepfamilies from the perspective of evolutionary psychology. *See* STEPPARENTING, *supra* note 65.

67. *See supra* note 58; BIOSOCIAL DIMENSIONS, *supra* note 20.

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theories about stepfamilies are yet integrated with the state of knowledge in evolutionary psychology and evolutionary biology. And thus neither of them is integrated with the other. Indeed, one observer, commenting on an effort by sociologist David Popenoe to bring stepfamily theory and evolutionary theory together, noted:

> [T]here is still enough resistance to biosocial explanations among social scientists to retard interdisciplinary communication and cooperation and to impede the needed integration of biological and social-environmental perspectives on human behavior and institutions. For instance, a sociologist who tenders a biological explanation for phenomena for which there are popular social and cultural explanations still risks damage to his or her reputation and virtual ostracism by some factions in the discipline.[68]

It is, in part, as a by-product of this resistance that law continues to consider child abuse and stepfamily problems as unrelated phenomena.

Nevertheless, evolutionary analysis reveals that the seemingly separate orbits of child abuse and stepfamily theories can be encompassed within the larger orbit of evolutionary theories. More specifically, evolutionary analysis provides us with theories of ultimate causation, in this case DPS, which enable us to create an integrated model of child abuse and an integrated model of stepfamily tensions. In turn, these integrated models fit into a larger, more cohesive model of human behavior, that makes their more subtle interrelationships clear.

The purpose of integration, from law's perspective, is to construct a generally superior theory and model of the behavior law is charged with addressing. A model that unifies existing knowledge, that is historically accurate, and that uses a basic understanding of evolved psychology to bridge the distance between the subjects evolutionary biologists study and the subjects sociologists, economists, and historians study. One of the most significant features of this integrated model, and one easily missed by lawyers, as well as by those who already acknowledge certain genetic influences on behavior, is that it emphasizes genetic *similarity* between individuals over genetic *differences*. That is, an integrated model is predicated on the premise that the overwhelming bulk of human information processing traits are *shared in common* among members of our species.[69] The following sections demonstrate how the construction of behavioral models that build on this premise can yield an integrated model

68. Norval D. Glenn, *Biology, Evolutionary Theory, and Family Social Science*, *in* STEPFAMILIES: WHO BENEFITS? WHO DOES NOT?, *supra* note 55, at 45, 50.

69. Some of these traits will vary, non-randomly of course, on either side of the line drawn by sex, given 600 million years of sexual dimorphism. *See* RIDLEY, *supra* note 4; Kingsley R. Browne, *Sex and Temperament in Modern Society: A Darwinian View of the Glass Ceiling and the Gender Gap*, 37 ARIZ. L.J. 972, 973-1064 (1995) (surveying research on evolved sex differences).

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of child abuse, an integrated model of stepfamily tensions, and an integrated behavioral model that combines the two.

1. An Integrated Model of Child Abuse

Upon examination, it is clear that the theoretical substructures of the prevailing theories on child abuse do not conflict with those of the evolutionary theory. Given the effectively exclusive emphasis they place on the characteristics of abuser and abused, and on their respective lifetime experiences of environmental, socio-cultural influences, the prevailing theories on the causes of child abuse are paradigmatically theories that identify proximate causes, while the DPS theory contributes an ultimate cause analysis. And although the prevailing theories on child abuse appear to share a basic (albeit perhaps unexamined) assumption that all relevant causes are societal (and hence non-genetic) at the same time that the DPS theory reflects the basic assumption that behavioral predicates to parenting behavior can evolve, even in humans, this difference does not pose a true conflict. For it is not in fact necessary to the logic of the prevailing theories that behavior *not* be subject to evolutionary processes. Nor do the predictions of the prevailing theories conflict with those of the DPS theory in a fashion likely to impede integration. Examining two representative predictions will make this clear.

First, the prevailing theories predict that a handicapped child will be at a statistically greater risk of abuse than a non-handicapped child. Their logic is that it is more difficult for parents to develop a strong social attachment to the child, that it is more difficult for parents to raise a handicapped child than a non-handicapped child, and that the stresses these difficulties induce can result in abusive behavior. Second, the prevailing theories predict that children in poor families will be at somewhat greater risk of abuse. Their logic is that it is more difficult for parents to raise children without steady access to adequate resources, and that the stresses this difficulty induces can result in abusive behavior.

The theory of DPS makes the same two predictions, but for different reasons. Handicapped children will be at increased risk because, in part, human psychology has evolved to respond with affection and care to infant gene vehicles in proportion to their probable eventual contribution to parental reproductive success, as evident from observable cues of such indicators as infant health. Because such cues are absent (or reduced) in handicapped infants, these infants simply fail, on average, to evoke the extraordinary psychological and emotional states that tended to prompt an adult, at great immediate cost to self, to lavish resources upon another organism. Neglect or abuse may follow. Children in poor families will be at somewhat greater risk of abuse because human psychology has evolved to make the qualitative and quantitative extent of parental care

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both condition-specific and infant-specific. Thus, where resources to raise all dependent children to healthy independence are in short supply, young, sickly, and/or supernumerary children are most likely to have their proportional share of resources redirected toward other existing or future offspring. Natural selection rewards heritable psychological predispositions that tend to yield behavior that tends toward optimizing inclusive fitness returns on parental investment.

To integrate these two ideas, one need recognize that the DPS theory is not an alternative to the prevailing theories. In fact it completes them and gives them explanatory sense. While prevailing theories simply *assume* without explanation that certain environmental stimuli will be stressful, because we all empathically understand that they would be, understanding how discriminative parental solicitude became a prominent component of a species-typical, evolved, human psychology affords an understanding of *why* parents are likely to experience handicaps and poverty as stressful, and *why* such stresses are more likely to result in neglectful or injurious behavior to given children than in any of the myriad alternative stress-responsive behaviors.[70] DPS not only explains *why* people are likely to find handicapped children or supernumerary children less appealing, but it also draws a logical connection—in a way prevailing theories alone cannot—between the stresses thereby induced and the abusive behavior itself. In the environment in which the brain and the behavioral predispositions of nearly every species manifesting parental care evolved, discriminative parental solicitude yielded greater reproductive success on average than did *in*discriminate parental solicitude. DPS consequently spread in such species to larger and larger proportions of every successive generation until it became thoroughly species-typical. Even in humans, therefore, who introduce an unprecedented quantum of analytic reasoning into their behavioral repertoires, DPS can be expected, on the margin, to manifest itself in behaviors that reflect the logic of adaptation: Don't squander parental resources on poor investments if the same investment would probably yield higher returns elsewhere.

Depending on how you look at it, evolved DPS, undoubtedly one of the least controversial psychological mechanisms in all of evolutionary biology, provides either a missing piece of the explanatory puzzle, or an overarching framework that enables patterns of child abuse in humans, as well as patterns of juvenile harm in other animals, to make sense. Sense not only within the context of abuse, but sense within the whole universe of animal behavior.

An integrated, blended, holistic understanding of child abuse would therefore categorize some abusive behavior within the larger context of

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70. The study of child abuse, to date, can be generally characterized as a search for "marker variables *associated* with abuse," while little work has in fact focused on theoretical frameworks to *explain* the associations. *A Continuum of Violence?*, *supra* note 23 (emphasis added).

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child-rearing behavior, child-rearing behavior within the larger context of reproductive strategies, and reproductive strategies within the larger context of evolutionary processes, including natural selection. Taking it from the top, natural selection rewarded with persistence through time those traits that contributed toward their own replication. These, mixed in varying combinations, yielded genetically-influenced patterns of morphology and behavioral predispositions constituting reproductive strategies, the distinctions between which mark the boundaries of what we now call species. Child-rearing is but one element of the reproductive strategy typical of our own primate species. And an accompanying, evolved, animal psychology that would correlate subjective emotional and motivational states with behavior tending to optimize inclusive fitness returns on parental investment would be more adaptive than one indifferent to indicia of probable returns.

Thus, human parental behavior (in its default position—which can of course be affected by other environmental and genetic influences) is not reflexively evoked by simply *any* human child, but rather is subtly contingent on particular, infant-specific, context-specific environmental cues. And that contingency follows an adaptive logic that makes sense in light of natural selection, to bias parental investment toward kin and, among kin, according to cues that were predictive of inclusive fitness returns in ancestral human environments.[71] DPS is therefore powerfully likely to contribute to the emergence, from the collected behaviors of many individuals, of not only non-random patterns of large and small investments of parental resources but also of patterns that can be organized around *precisely* the demographic and context-specific variables on which natural selection would exert the most pressure.

2. *An Integrated Model of Stepfamily Tensions*

The "special problems" of "reconstituted families," such as stepfamilies, were noted by psychologists and sociologists in the 1920s and 1930s.[72] Between then and now, hundreds of researchers have diligently documented how stepfamilies are subject to greater amounts of "stress, ambivalence, and low cohesiveness" than the average family.[73] The vast bulk of these

71. Margo Wilson & Martin Daly, *The Psychology of Parenting in Evolutionary Perspective and the Case of Human Filicide*, *in* INFANTICIDE & PARENTAL CARE, *supra* note 24, at 73, 74.

72. *See* LUCILE DUBERMAN, THE RECONSTITUTED FAMILY: A STUDY OF REMARRIED COUPLES AND THEIR CHILDREN 1-3 (1975) (discussing briefly the early scholarship on stepfamilies).

73. DUBERMAN, *supra* note 72, at 2, citing, for example, Charles E. Bowerman & Donald P. Irish, *Some Relationships of Stepchildren to Their Parents*, *in* MARRIAGE AND FAMILY IN THE MODERN WORLD 580 (Ruth S. Cavan ed., 1969).

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studies are atheoretical.[74] But it has been customary, since the 1970s, to attribute these greater stresses to the "need for time to assume new roles."[75] Participants in the reconstituted family, it is argued, "have not been step-family members before and are generally unsure of themselves in their new statuses . . . and are not quite sure themselves what is required of them."[76] Stepparents and stepchildren lack extra-familial institutionalized social norms, from "language, the law, and custom," that would tell each how to behave.[77] Consequently, stepfamily researchers have reported that one of their most important "assumptions . . . about reconstituted families," an assumption that provides a starting point for additional research, is that:

> The most detrimental factors in the reciprocal relationship of the stepparent and the stepchild are hostility, competition, and jealousy, *all of which arise from feelings of insecurity and role confusion* on the part of each, and *originat[e] in . . . the society.*[78]

Such a bold, proud assumption, of course, simply echoes the standard social science model of human behavior, in which all relevant influences on behavior "originate" in society.

Upon examination, it is clear that the theoretical substructures of this social science model do not conflict with those of evolutionary theory. Given the effectively exclusive emphasis that "role theory" places on the individual experiences of the stepfamily members, within a culture that treats stepfamilies in particular ways, the prevailing theory on the causes

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74. Kay Pasley & Marilyn Ihinger-Tallman, *The Evolution of a Field of Investigation: Issues and Concerns, in* REMARRIAGE AND STEPPARENTING 303, 305 (Kay Pasley & Marilyn Ihinger-Tallman eds., 1987) [hereinafter REMARRIAGE AND STEPPARENTING] ("For the most part studies of remarriage and stepparenting are atheoretical."). Researchers surveying recent stepfamily scholarship, for example, concluded that barely 12% of the works made explicit reference to any theory that might explain their findings. Kay Pasley et al., *Remarriage and Stepfamilies: Making Progress in Understanding, in* STEPPARENTING, *supra* note 65, at 1, 10.

75. DUBERMAN, *supra* note 72, at 5-6. *See also*, Jean Giles-Sims, *The Stepparent Role: Expectations, Behavior and Sanctions*, 5 J. FAM. ISSUES 116 (1984); Kay Pasley, *Family Boundary Ambiguity: Perceptions of Adult Stepfamily Members, in* REMARRIAGE AND STEPPARENTING, *supra* note 74 at 73, 74; Bray et al., *Role Integration and Marital Adjustment in Stepfather Families, in* STEPPARENTING, *supra* note 65, at 69, 69 ("Given the general lack of socially and legally prescribed roles for stepparents, this task [of bringing a stepparent into a new "family system"] is often fraught with stress and uncertainty."). For an elaboration of "systems theory," that focuses on loosely defined or ambiguous intra-family boundaries, see Jean Giles-Sims, *Comparison of Implications of the Justice and Care Perspectives for Theories of Remarriage and Stepparenting, in* STEPPARENTING, *supra* note 65, at 33, 37.

76. DUBERMAN, *supra* note 72, at 5-6.

77. *See, e.g.*, Andrew Cherlin, *Remarriage as an Incomplete Institution*, 84 AM. J. SOCIOL. 634, 646 (1978).

78. DUBERMAN, *supra* note 72, at 7-8. (emphasis added). Margaret Mead's theory for the finding that step-relations are not satisfactory: "Each American child learns early and in terror that his whole security depends on that single set of parents . . . . We have never made adequate social provision for the security and identity of the children if that marriage is broken." *Anomalies in American Postdivorce Relationship, in* DIVORCE AND AFTER 102 (Paul Bohannan ed., 1970).

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of stepfamily tension is paradigmatically a theory that identifies proximate causes, whereas the DPS theory contributes an ultimate causation analysis. Despite their different orientations, however, "role theory" and DPS theory operate at completely different levels of analysis, proximate and ultimate respectively. This distinction creates no obstacle to integration. And while role theory's basic assumption that all relevant causes are societal (and hence non-genetic) appears to conflict with the DPS theory's basic assumption that behavioral predispositions toward unrelated but dependent juveniles can evolve (and are therefore necessarily influenced by gene combinations) such a conflict is a false one—the product of the exclusionary bias of the standard social science model, not of exclusionary necessity.

Yet unlike the predictions of prevailing and evolutionary theories of child abuse, which are quite similar in relevant respects, predictions of role theory and DPS theory occasionally conflict. For example, role theory implicitly predicts that if one were to examine the historical record, one would discover that stepparenthood in modern times is a *novel* social role. Otherwise it would be institutionalized by now. Evolutionary theory instead predicts that substitute parents would tend to be present in the historical record quite frequently—whenever for both a particular male and female the long-term potential to increase reproductive success by a union, even with someone who has a dependent child, was greater than that probably resulting from an alternative mating strategy (such as single-parenting or, perhaps, involuntary abstinence). The latter prediction far more closely fits the facts of the historical record.[79] Across human history, substitute parents have been common. And whereas role theory predicts that stepparent-stepchild relations would become less problematic as increasing numbers of stepfamilies generate and institutionalize standards of conduct,[80] DPS theory predicts that step relationships will be *more* conflictual in *all* human societies, *regardless* of their prevalence or rarity, and hence regardless of their "institutionalization." Again, the latter prediction more closely fits the facts.[81]

Despite this analysis, however, which only begins to whittle away some of the incompatible projections from the strong version of role theory, there are still sufficient compatibilities between the prevailing social science theories on stepparent tensions and evolutionary theory to enable useful integration. For example, the fact that role theory does not adequately explain *why* stepfamilies are more stressful does not negate the

79. Martin Daly & Margo Wilson, *Stepparenthood and the Evolved Psychology of Discriminative Parental Solicitude,* in INFANTICIDE & PARENTAL CARE, *supra* note 24, at 121, 127 [hereinafter *Stepparenthood*].

80. *See, e.g.*, Jean Giles-Sims, *The Stepparent Role: Expectations, Behavior, and Sanctions*, 5 J. OF FAM. ISSUES 116, 127 (March 1984).

81. *Stepparenthood, supra* note 79.

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social science theory predictions (based, somewhat tautologically, on findings to the same effect) that stepfamilies *will be* more stressful than families composed only of children genetically related (or at least subjectively believed to be genetically related) to both parents. This is entirely consistent with what DPS predicts. Moreover, DPS provides a parsimonious explanation for why studies show that stepparents are less likely to feel love for stepchildren, less likely to feel the same loyalty to stepchildren that they feel for their own children, and more likely to find the presence of stepchildren stressful.[82] That is (and this refrain should sound familiar) the process of natural selection will have penalized, over time, any behavioral predisposition to treat kin and non-kin identically. Similarly, it will have rewarded, over time, predispositions to psychological states tending to direct finite parental resources toward kin. (This means only that, whatever the incidence of abuse, stepparents will be over represented, however incrementally, among abusers; it does not mean that most stepparents will abuse.[83])

Consequently, an integrated, blended, holistic understanding of stepfamily dynamics would therefore categorize a stepfamily union within the larger context of mating behavior (as one in which the rearing of an unrelated child is but a cost of receiving the benefit of exclusive access to the child's parent). It would then place mating behavior within the larger context of reproductive strategies, and reproductive strategies within the larger context of evolutionary processes, including natural selection. And, as above, natural selection rewarded with persistence through time those traits that contributed toward their own replication. These, mixed in

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82. From the vast literature on dissatisfactions of stepfamily life, see Terry F. Perkins & James P. Kahan, *An Empirical Comparison of Natural-father and Stepfather Family Systems*, 18 FAM. PROCESS 175 (1979); J.W. Santrock & K.A. Sitterle, *Parent-Child Relationships in Stepmother Families*, *in* REMARRIAGE AND STEPPARENTING, *supra* note 74, at 73, 74; Lynn K. White & Alan Booth, *The Quality and Stability of Remarriages: The Role of Stepchildren*, 50 AM. SOCIOL. REV. 689 (1985); E. FERRI, STEPCHILDREN: A NATIONAL STUDY (1984); J.Z. Anderson, and G.D. White, *An Empirical Investigation of Interaction and Relationship Patterns in Functional and Dysfunctional Nuclear and Stepfamilies*, 25 FAM. PROCESS 407 (1986). Stepparents do not generally feel the same child-specific love and commitment as genetic parents, nor do they perceive the same emotional rewards from their parental investment. *See* discussion in Martin Daly & Margo Wilson, *Risk of Maltreatment of Children Living With Stepparents*, *in* BIOSOCIAL DIMENSIONS, *supra* note 20. Researchers have found that only 53% of stepfathers and only 25% of stepmothers claimed "parental feeling" toward their stepchildren and even fewer claimed to "love" them and that both marital partners in step-families indicate they are looking forward to the children's departure, and stepchildren do in fact leave home at an earlier age than those living with natural parents. DUBERMAN, *supra* note 72; J.H. Rankin, *The Family Context of Delinquency*, 30 SOC. PROBS. 466 (1983).

83. Note that whether or not a behavior is currently adaptive is irrelevant to whether or not that behavior can properly be considered to have evolved. Human psychology adapted to ancient environments, not modern ones. *See, e.g.*, Sarah Blaffer Hrdy, *Assumptions and Evidence Regarding the Sexual Selection Hypothesis: A Reply to Boggess*, *in* INFANTICIDE: COMPARATIVE AND EVOLUTIONARY PERSPECTIVES, *supra* note 24, at 315. Confusion about this has, unfortunately, lead some to misunderstand (at least initially) arguments grounded in ultimate causation. *See, e.g.*, Sarah Lenington, *Child Abuse: The Limits of Sociobiology*, 2 ETHOL. & SOCIOBIOL. 17, 26 (1981) ("it . . . would be extraordinarily difficult to show that individuals who abuse their children are, in fact, increasing their reproductive success.").

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infinite combination, yielded genetically-influenced patterns of morphology and behavioral predispositions that constituted reproductive strategies, the distinctions between which mark the boundaries of what we now call species. Procuring a mate is but one element of the reproductive strategy typical of sexually reproducing species. And an accompanying, evolved, animal psychology that would correlate subjective emotional and motivational states with behavior tending to optimize inclusive fitness returns on parental investment would be more adaptive than one indifferent to indicia of probable returns.

Thus, human mating behavior, while expected in the aggregate to shy from responsibility for unrelated children, may also be expected to evidence a condition-dependent willingness to accept such responsibility in circumstances that, during the environment of evolutionary adaptation, would have suggested that the probable benefits to reproductive success of such a union would outweigh the costs of investing resources in another's child. *At the same time*, the adaptive logic of favoring kin over non-kin is expected to result in more stepfamily "tensions" (if such are defined in part, as they implicitly are in much of the social science research, as those emotional and logistical frictions that stem from the lack of the affectional psychology and behavior typical to families in which both parents are *equally* related to every child). This is because a child that does not exhibit cues long associated with relatedness is less likely to evoke, in the stepparent, the psychological state of parental solicitude.

Again, then, an evolved, species-wide, psychological mechanism predisposing humans to allocate their finite and precious parental resources to other individuals in ways that discriminate in favor of those most likely to contribute to parental reproductive success, enables patterns of tension between stepparents and their stepchildren to make sense.

3. Integrating Models of Child Abuse and Stepfamily Tensions

One principal benefit of integrating behavioral models for particular behaviors is that integrated models of differing behaviors are themselves often easily integrated. Theories of ultimate causation extend horizontally to link behaviors historically separated vertically. Once the models of child abuse and stepfamily tensions have each been integrated, to reflect both proximate and ultimate causation, for example, it is a relatively simple matter to integrate each with the other.

Viewed only at the level of proximate causation, patterns of child abuse and of stepfamily tensions seem entirely unrelated. Socio-cultural influences that social sciences have correlated with the one seem categorically different from those associated with the other. Absent an evolutionary analysis, there is little reason to suspect that the two have much to do with one another. But in the light of evolutionary psychology,

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deep commonalities are revealed, suggesting that the two phenomena are quite closely related. They both appear to trace, at least in part, to the same evolved, species-typical behavioral propensity: discriminative parental solicitude. That is, a *single* aspect of evolved human psychology can reconcile the demographic patterns of children most likely to be abused with the patterns of tensions and conflict within stepparent-stepchild dyads.

The elegance that the evolutionary perspective affords integrated behavioral models is that it provides a broad, thematic coherence that in many ways provides at a meta-level the same attention to complex dynamic interactions that "systems theory" of the social sciences reflects. That is, analysis at the level of ultimate causation provides an overarching "system" to systems—a recognizable, predictable, and understandable super-pattern to the discrete, isolated, and often unintegrated local patterns, the boundaries of which today reflect somewhat arbitrary disciplinary divisions.

An integrated behavioral model, which puts many of the proximate causes from the standard social science models within the framework of the ultimate causation that evolutionary theories afford, enables us to see reciprocal connections between child abuse and stepparentage, and between these and other important aspects of human behavior. And once the family is seen as epiphenomenal to a psychology evolved to predispose humans toward reproductive success, the alliances between mates, and between adults and juveniles, seem more tenuous than commonly supposed—more the product of interests that necessarily overlap and diverge than of interests that are identical in all particulars. We can see that patterns in both the neglect, maltreatment, and abuse of children, on the one hand, and the love of them and devotion of extraordinary resources to them, on the other, derive from the same source. The dynamics of child abuse and stepfamily tensions can then be viewed as one end of a continuum of intra-familial behaviors, all of which will, all else being equal, tend to reflect the logic of adaptation, which in turn reflects the natural selection pressures that existed in our ancestors' times—long before our ability to create environments that increasingly diverged from those to which our minds and bodies were adapted.

In this sense, exposing the logical link between child abuse patterns and stepfamily tensions is simply one of many successive linkages, each of which pulls toward one integrated whole several already accumulating masses of behaviors and data. Once, for example, child abuse and stepfamily tensions are conceptually joined by the recognition that each incorporates an evolved discriminative parental solicitude, they continue together in a series of behavioral affiliations that makes them cousins to

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such likewise linked things as patterns in sex preferences for offspring[84] and patterns in preferred number of offspring.[85] These all, in turn, can then be seen as related to predictable patterns in parent-offspring conflict[86] (including maternal-fetal conflict[87]); patterns in sexual, courtship, and mating behavior;[88] patterns in parental manipulation of offspring's behavior;[89] patterns in marriage/divorce/remarriage demographics;[90] patterns in sexual jealousy;[91] patterns in domestic and other violence;[92] patterns in risk-taking behavior;[93] patterns in cooperation and conflict;[94] and the like.

What this process demonstrates is that by building in *The Integration Stage* of evolutionary analysis upon the structured foundation provided by

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84. *See* Robert Trivers & Dan Willard, *Natural Selection of Parental Ability to Vary the Sex Ratio of Offspring*, 179 SCIENCE 90 (1973); Owen D. Jones, *Reproductive Autonomy and Evolutionary Biology: A Regulatory Framework for Trait-Selection Technologies*, 19 AM. J.L. & MED. 187 (1993) (surveying, in part, evidence regarding the Trivers-Willard hypothesis).

85. *See, e.g.*, Guy Beauchamp, *The Functional Analysis of Human Fertility Decisions*, 15 ETHOL. & SOCIOBIOL. 31 (1994).

86. *See, e.g.*, Daly, *supra* note 30; Martin Daly & Margo Wilson, *Is Parent-Offspring Conflict Sex-Linked? Freudian and Darwinian Models*, 58 J. PERSONALITY 163 (March 1990).

87. *See, e.g.* David Haig, *Genetic Conflicts in Human Pregnancy*, 68 Q. REV. BIO. 495 (1993).

88. *See, e.g.* HUMAN REPRODUCTIVE BEHAVIOUR: A DARWINIAN PERSPECTIVE (Laura Betzig et al. eds., 1988); DAVID BUSS, THE EVOLUTION OF DESIRE: STRATEGIES OF HUMAN MATING (1994) [hereinafter THE EVOLUTION OF DESIRE]; David M. Buss & David P. Schmitt, *Sexual Strategies Theory: An Evolutionary Perspective on Human Mating*, 100 PSYCH. REV. 204 (1993); David M. Buss, *Sex Differences in Human Mate Preferences: Evolutionary Hypotheses Tested in 37 Cultures*, 12 BEHAV. & BRAIN SCI. 1 (1989); GOLDSMITH, *supra* note 9, at 60-67; ROBERT WRIGHT, THE MORAL ANIMAL: EVOLUTIONARY PSYCHOLOGY AND EVERYDAY LIFE 55-107 (1994); Linda R. Hirsch & Luci Paul, *Human Male Mating Strategies: I. Courtship Tactics of the "Quality" and "Quantity" Alternatives*, 17 ETHOL. & SOCIOBIOL. 55 (1996); Luci Paul & Linda R. Hirsch, *Human Male Mating Strategies: II. Moral Codes of "Quality" and "Quantity" Strategists*, 17 ETHOL. & SOCIOBIOL. 71 (1996); John Marshall Townsend et al., *Low-Investment Copulation: Sex Differences in Motivations and Emotional Reactions*, 16 ETHOL. & SOCIOBIOL. 25 (1995).

89. *See generally* TRIVERS, *supra* note 43, at 145-165.

90. *See, e.g.*, HELEN E. FISHER, ANATOMY OF LOVE: THE NATURAL HISTORY OF MONOGAMY, ADULTERY, AND DIVORCE (1992).

91. *See, e.g.*, THE EVOLUTION OF DESIRE, *supra* note 88; David M. Buss et al., *Sex Differences in Jealousy: Evolution, Physiology, and Psychology*, 3 PSYCH. SCI. (July 1992); Martin Daly et al., *Male Sexual Jealousy* 3 ETHOL. & SOCIOBIOL. 11 (1982).

92. *See, e.g.*, HOMICIDE, *supra* note 25; Martin Daly & Margo Wilson, *Evolutionary Psychology of Male Violence, Explanations and Theoretical Perspectives, in* MALE VIOLENCE 253 (John Archer ed. 1993); *Evolutionary Social Psychology*, *supra* note 25, at 519; Martin Daly & Margo Wilson, *Evolutionary Psychology and Family Violence, in* SOCIOBIOLOGY AND PSYCHOLOGY: IDEAS, ISSUES AND APPLICATIONS (Charles Crawford et al. eds., 1987); David M. Buss, *From Vigilance to Violence*, 9 ETHOL. & SOCIOBIOL. 291 (1988); Margo Wilson & Martin Daly, *An Evolutionary Psychological Perspective on Male Sexual Proprietariness and Violence Against Wives*, 8 VIOLENCE & VICTIMS 271 (1993); Martin Daly et al., *Children Fathered by Previous Partners: A Risk Factor for Violence Against Women*, 84 CANAD. J. PUB. HEALTH 209 (1993); Russell P. Dobash et al., *The Myth of Sexual Symmetry in Marital Violence*, 39 SOC. PROBS. 71 (Feb. 1992); Margo Wilson & Martin Daly, *Spousal Homicide Risk and Estrangement*, 8 VIOLENCE & VICTIMS 3 (1993).

93. *See, e.g.*, Margo Wilson & Martin Daly, *Competitiveness, Risk Taking, and Violence: The Young Male Syndrome*, 6 ETHOL. & SOCIOBIOL. 59 (1985). *See also* Paul H. Rubin & Chris W. Paul, *An Evolutionary Model of Taste for Risk*, 17 ECON. INQUIRY 585 (1979).

94. *See, e.g.*, ROGER D. MASTERS, THE NATURE OF POLITICS (1989); ROBERT AXELROD, THE EVOLUTION OF COOPERATION (1984); HOMICIDE, *supra* note 25; Martin Daly & Margo Wilson, *Homicide and Kinship*, 84 AM. ANTHRO. 372 (1982).

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The Identification Stage (which framed the inquiry) and *The Information Stage* (which explored evolutionary predicates for law-relevant behavior) law can both pursue and achieve a more complete and richly contextualized understanding of its human subject. That is, by identifying salient differences and similarities between standard social science model theories of proximate causation and evolutionary theories of ultimate causation, law can inform itself of a model for human behavior that more seamlessly interconnects, interweaves, and finally integrates previously isolated systems of disciplinary knowledge.

IV. IMPLICATIONS FOR LAW

My principal purpose has been to explore, in the foregoing parts, the integrative component of one possible method for conducting evolutionary analysis in law.[95] And although I have elsewhere elaborated on the relevance of such integration to the fourth, final, and most practical stage of the analysis, *The Application Stage*,[96] I would nonetheless be remiss not to address briefly three probing questions that all the foregoing is likely to provoke.

> Precisely why does all this matter to law?
> What difference does it make?
> And why is this anything other than simply very interesting?

Together, and at their most challenging, these questions really ask: What reason is there to believe that a more "integrated" model of human behavior necessarily translates into any concrete benefit to the legal system? The answers, each of which I believe to be independent and sufficient justification, are several.

First, and foremost, there are benefits to disciplinary integrity. All else being equal, accuracy is better than inaccuracy. And any behavioral model that fails to locate human behavior against a backdrop of evolved morphology, psychology, and behavior is inaccurate, regardless of whether that failing makes a discernable difference in any particular legal context. There may be good reason, on occasion, for a legal system to engage in legal fictions. For largely administrative reasons, for example, the courts will sometimes, quite knowingly, treat a legal issue as having *been* previously raised and adjudicated, because it *could have been* raised and adjudicated, even if it *has not actually been* raised and adjudicated. But to engage in the fiction that all law-relevant behavior is socially constructed because of avoidable ignorance, or to knowingly engage in such a

95. *See* Appendix.
96. See Jones, *supra* note 16, Part II.D

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fiction without an affirmative and justifiable decision to do so, is irresponsible.

Second, there are usually benefits to seeing the big picture, even when these are unquantifiable. Although it is not always possible to easily sketch the advantage that an integrated model of human behavior affords, it is rare that seeing only the small picture, rather than the big, makes one more effective at pursuing one's own purpose. Though the benefits of seeing the big picture are not susceptible of pithy description, they are nonetheless important and worthy of serious attention—perhaps even more so for the ease with which they can be overlooked. And those benefits will undoubtedly parallel, for our balkanized conception of human behavior, the benefits of treating a tree-like leg, a snake-like trunk, a rope-like tail, and a wall-like torso as an elephant, rather than as individual parts groped by blind men.

The importance of the accuracy of the behavioral model increases proportionally to the importance of the change law is trying to effect in human behavior. It makes no difference whether you have a flat-Earth or round-Earth model of the universe so long as all you want to do is plant crops. But it makes a big difference if you want to move ships between continents, or put men on the moon. Similarly, whether one has a simple, standard social science model for the causes of child abuse or a model that integrates sociology, psychology, and biology, makes little difference if all you want to do is throw a broad, general policy program at the phenomenon. Through careful observation, the traditional approaches of the social sciences can identify a number of proximate factors, the reduction of which can contribute to the success of general policies. But it makes a big difference which model you employ if you want to launch a sustained and aggressive campaign against child abuse that squeezes the most efficient return, in terms of decreased abuse, from the same, finite investment of social and legal resources. That is, an integrated model can help to target those resources more narrowly at the segments of the population (like stepparents) most likely to abuse children, and toward reducing the prevalence of those environmental factors (such as poverty and other social stressors) most likely to contribute toward the incidence of that behavior.

Third, and more specifically, there are benefits from integration to our efforts to locate proximate causes of behavior and estimate the relative importance of each. Integration leads us to expect that natural selection will have left humans today with behavioral predispositions that tended to increase individual inclusive fitness in ancestral times. By means of this insight, and some general facility in the patterns by which inclusive fitness can be increased and decreased, we can confidently predict the major contours of behavioral patterns likely to emerge in modern society. Prior to the arguments of evolutionary theorists, for example, which were based on an integrated model of human behavior, no scholars seemed prepared

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to state, justify, or pursue a prediction that stepchildren would be at a far higher risk of child abuse and homicide than would other children. Instead, scholars considered the perception of that risk groundless, and indeed today the risk continues to be ignored by entire industries of scholarship. An integrated model of human behavior, however, predicts this risk independent of any prior perceptions or data.

Fourth, there are advantages from integration to our ability to identify and evaluate the respective costs and benefits of simultaneously pursuing different legal goals. Because an integrated perspective is more likely than an unintegrated one to establish connections between seemingly disparate forms of behavior, it is also more likely to uncover connections that trade the successful pursuit of one goal against the successful pursuit of another. Such hidden conflicts, left undiscovered, undercut the overall effectiveness of a legal regime, as surely as efforts to drain a pool at one end and to fill it at the other. For example, an integrated model says nothing about whether law should somehow target stepparents as part of a larger effort to reduce child abuse, or whether law should expand legal rights of stepparents in an effort to destigmatize them. But an integrated model *does* make clear, for the first time, that these two goals are necessarily in conflict. That is, either one cost of reducing child abuse is the stigmatization of stepparents, or the cost of not stigmatizing stepparents is some number of otherwise preventable child abuse incidents (even infanticides). Consequently, evolutionary analysis can starkly reveal significant subsurface tensions between policies that previously seemed to peacefully coexist. By doing so, it can increase the comprehensiveness of the cost-benefit evaluations that help society select and prioritize legal goals.

Fifth, integration can provide theory to buttress wobbly belief. Models matter. And the lack of a good one can sink an otherwise sound legal policy. So even in those cases in which conceptual integration does nothing more than provide an explanation for an already perceived causal connection, it will have done plenty. For we are often hesitant to construct a legal policy on the foundation of observations that lack explanations. For good reason, we suspect the presence of complicating confounds, and doubt the wisdom of a policy built only on perceived connections, and nothing more. For example, even in the presence of an antecedent belief that children are at greater risk of abuse in a home with a stepparent than in one without, we might hesitate to act. And even in the presence of data indicating that that belief was largely accurate, we may still hesitate, thinking that such a correlation may be attributable to as yet unidentified and more palatable phenomena having nothing to do with stepparent status. In such circumstances, we implicitly await improvements in behavioral models, such as that which conceptual integration can provide.

All in all, an integrated model provides a number of immediate and less immediate advantages to law. It facilitates a sensitivity to species-typical

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behavioral rhythms, desires, and abilities. Because it is probabilistic, not deterministic, evolutionary analysis can help us better to understand human behavior by illuminating its historical context, by highlighting its dynamic processes, by providing insights into its origins, and by suggesting circumstances that are more likely to evoke certain behavioral responses than others. That is, it increases behavioral predictability and decreases the number of behaviors that will be dismissed as novel and unanticipated, or aberrational, random, and unconnected.

If we are serious about our collective assertions that laws should further our democratically-fashioned goals and social order, then we should not only welcome, but aggressively pursue, the contributions evolutionary analysis can supply to the formulation of sophisticated legal policies. For it will increase law's ability to pursue whatever democratically-percolated goals it undertakes by integrating the behavioral model on which it relies with continuing advances in other behavioral disciplines. It will ultimately provide a more solid fulcrum. And a more solid fulcrum will improve law's ability to shift patterns in human behavior.

CONCLUSION

Every legal system has, as its fulcrum, a behavioral model that purports to explain observable patterns of human activity. The law can obtain no more leverage on human behavior than the solidity of that behavioral model allows.

At present, however, most of us directly involved with shaping and applying the legal system, such as legal policymakers, legal decisionmakers, lawyers, and legal academics, seem unaware even that we *have* a model. Let alone what that model might be. This would continue to be untroubling, as it has been for so long, but for the fact that our model is now certainly obsolete. When we dust it off we discover that it often operates on the unstated assumption that law-relevant behavior flows from a magical mind—loosed from its own evolutionary history and shaped almost exclusively by learning, culture, and experiences. That is, we still, even if more from unconscious habit than from decision, often subscribe to the pre-Darwinian myths that *Homo sapiens sapiens* differs from other animals in kind, not just in degree, and that the influence of human mind on behavior means that all human behavior comes from mind—socially constructed by the summed experiences an individual encounters in a single lifetime. Modern behavioral science has punctured these myths, exposing the social constructivist behavioral model as importantly incomplete. And therefore, to the precise extent that law depends almost exclusively upon it, law will remain, like its model, seriously flawed. A flawed model imports in this context what it imports

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in every other: that all efforts based upon it are less likely to be successful than would be efforts based on a less flawed model.

Law, instead, should be leveraging against an integrated model of human behavior. One that, far from over-simplifying human behavior, reflects the most complete understanding available of the multiple and complex influences on behavior. One that is more richly nuanced, incorporating the most rigorously tested developments of the behavioral sciences with the most careful empirical observations of the social sciences. And one that better vindicates, more fully than prevailing, unsupplemented, social constructivist models can alone, our species' unique history, consciousness, capabilities, and richly complex behavioral processes.

This, in turn, requires that we in law cease being passive recipients of almost exclusively standard social science models of behavior and begin to participate actively in interdisciplinary, integrative processes. It requires that we get comfortable with the simultaneity of proximate and ultimate causes—that we recognize that humans share internal, information processing characteristics that are *distinctly human*, just as we have more observable external characteristics that are distinctly human. It requires that we anticipate that evolved human psychology will reflect the logic of adaptation, and that it will predispose us, on average, toward behavior that was adaptive in that ancient environments in which most of our physical and neural architectures were shaped. Finally, it requires that we regularly undertake evolutionary analyses, such as that herein described, to actively assist in the creation of behavioral models superior to those on which current legal thinkers and policy-makers so often rely.

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APPENDIX

EVOLUTIONARY ANALYSIS IN LAW: A MODEL

I. The Identification Stage: On Purpose and Process
- A. What is The Legal Goal?
- B. Will Evolutionary Analysis Further Pursuit of That Goal?
  1. What Are The Prevailing Theories?
  2. Is the Failure to Achieve the Goal Solely Attributable to Inadequate Implementation of Adequate Theories?
  3. Are the Prevailing Theories Already Informed by the Influence of Natural Selection on Behavior?
  4. How Greatly Might the Behavior in Question Have Affected the Reproductive Success of Our Ancestors?

II. The Information Stage: On Theories and Evidence
- A. What Are the Relevant Evolutionary Theories and Predictions?
- B. What Empirical Evidence Bears on Those Predictions?
- C. How Does the Evidence Fit the Predictions?
- D. Do the Theories Apply to Humans?
- E. Should the Theories Be Considered in Legal Analysis and Policy-Making?

III. The Integration Stage: On Conflicts and Compatibilities
- A. Where Do Prevailing and Evolutionary Theories Conflict?
  1. Conflicts Between Theoretical Substructures
     a) Levels of Analysis
     b) Basic Assumptions
  2. Conflicts Between Predictions
- B. How May Non-Conflicting Elements Be Integrated?

IV. The Application Stage: On Utility
- A. How Can Evolutionary Analysis Help to Refine Behavioral Models?
  1. Emphasizing Both Proximate and Ultimate Causation
  2. Revealing New Associated Environmental Factors ("AEFs")
  3. Restating Prior AEFs More Precisely
  4. Predicting Interactions of AEFs
- B. How Can Evolutionary Analysis Help to Generate New Legal Strategies?
  1. New Strategies for Newly Identified AEFs

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C. How Can Evolutionary Analysis Help to Improve Cost-Benefit Analyses?
   1. Identifying Policy Conflicts
   2. Clarifying Costs of Conflicts

D. How Can Evolutionary Analysis Help to Reveal Promising Directions for Future Research?
   1. New Ways to Collect and Slice Data
   2. Further Study of Multiple Evolutionary Theories
   3. Further Research to Test Conflicting Predictions

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