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We endorse much of Jones's excellent discussion of how collective action is relevant to understanding kinship. We think it is impossible to understand human sociality, including kinship dynamics, without appreciating the role that selection relating to collective action has played over evolutionary time in building into the human psychological architecture a specialized coalitional psychology with its own distinctive procedures and circuitry (Tooby and Cosmides 1988). The ancestrally stable features of situations involving the intersection of collective action with kinship, coalitional aggression, and production should have selected for a suite of neurocognitive adaptations in the human mind that are computationally organized to perceive, represent, and motivate the solutions to the adaptive problems embedded in these repeated games. Conditions favoring collective action are so commonly impacted by kinship that kin selection must inevitably have shaped significant aspects of coalitional psychology.

As we analyze them, activities involving collective action are cognitively represented and behaviorally regulated primarily as a form of social exchange or reciprocity, and we have found extensive evidence that there are species-typical, neutral distinct cognitive adaptations specialized for reasoning about social exchange, including social laws (Cosmides and Tooby 2000). The intercontingent regulatory structure governing  $n$ -person social exchange can be abbreviated as "For individuals 1 through  $n$ , I (individual<sub>1</sub>) will do  $x_1$  if individual<sub>2</sub> does  $x_2$  and individual<sub>3</sub> does  $x_3$  . . ." (or "I will if you will"). When acts in the set are made contingent on other acts' performance, then individual<sub>1</sub> receives not only benefit  $b_1$  but the sum of the benefits to her or him of all acts undertaken by all of the individuals in the set that would not otherwise have been undertaken without her or his participation (the baseline condition). In the extreme case of complete intercontingency, each individual faces a payoff structure in which one's own participation or nonparticipation makes possible or blocks others' participation and hence makes possible or blocks the harvesting of new benefits possible only through joint action. Some of the components that we propose characterize this suite of cognitive adaptations are:

1. *Adaptations for detecting possible mutual gain.* Collective action would not be possible without the ability to scan the social world, representing, analyzing, and detecting situations that have the potential for accruing gains through coordinated action or mutually followed rules of conduct (norms). Specializations must be able to generate representations of alternative projects or rules of conduct that apply across sets of individuals, as well as compute the effect of alternative rules or courses of action on the actor's own welfare and on how others

will perceive their own welfare. That is, they must be able simultaneously to represent the self as merely one individual parallel to others (decentering) while maintaining a motivational system inclined to promote the best outcome for the self. Therefore, we think humans evolved a "theory of interests" (like "theory of mind")—a conceptual format that represents others' relations to potential and actual situations in terms of an abstract summary of their motivations ("self-interest"). Such cognitive adaptations are one major precondition for the emergence of local cultural systems of morality or justice. In the case of kin-based collective action ("kinship systems"), it is useful to be able to achieve the representation of others' interests in a common format that allows the mutual identification of which coordinated projects or norms will have sufficiently widespread appeal. For this reason, we believe that selection has shaped a species-typical conceptual format involving dimensions and primitives for representing kinship (such as sex, generation, lineality, affinity, and so on) that are likely to be relevant to generating possible rules that a sufficient number of people will recognize as simultaneously self- and mutually beneficial (that is, that allow situations and interactions to be framed in ways that highlight potential interindividual parallels in interest). Another powerful cognitive extension is the ability to represent groups, in part, as "individuals" or agents that can have interests, obligations, intentions, beliefs, statuses, and so on, in much the same way that individuals do.

2. *Defensive specializations against free riding.* Cheater detection circuits are required if  $n$ -person social exchange is to evolve and be evolutionarily stable. To function, cheater detection circuitry needs to be coupled to a component that modulates one's own level of compliance in response to others' levels of compliance. Such circuitry motivates greater effort when others are investing sufficiently (and contingently) and lower effort in the presence of free riding or indiscriminate investing. Hence, the presence of free riders threatens and may trigger the dissolution of an otherwise mutually beneficial intercontingent effort. Selection favored, where feasible, circuitry that embodies less costly alternatives to abandoning a potentially beneficial common enterprise. Therefore, our coalitional psychology also has available components motivating exposure of cheaters (or those investing the least) and their punishment or exclusion (such as recategorizing them as non-kin or no longer considering proposals originating from them for joint action, as when exposed hypocrisy undermines the position of someone to enforce a norm). Procedures for social comparison should be motivationally important and involve the representation of *own welfare* and *group welfare* and the comparison of one's own contribution and others' contributions on both an individual-by-individual and a pooled basis. Are others contributing less than I?

3. *Elements designed to promote reaching greater mutual benefit.* Since mutual benefit through collective action is hard to achieve and easy to undermine, collective action levels will often be far lower than optimum. The

recurrent opportunity to capture these unrealized benefits selected for design elements that promote upward movement, including an initial cooperative orientation somewhat parallel to tit-for-tat's opening cooperative move. This orientation involves a readiness to make the first move, initiating new upward movements at the beginning of any new event boundary that plausibly invites new collective projects, coupled to a decision-rule to modulate downwards if the effort goes unmatched. We recognize others' supernormative initiatives (we can be "inspired" by others, a complement to our being cooled by hypocrisy or defection). We are proud of our own supernormative efforts, especially if they successfully induce higher efforts in others, and shamed if our efforts are discovered to be lower than others', inhibiting positive interactions. The motivational system should be more willing to make an investment if it is public. Investments should tend to be made in a continuous flow of consecutive increments (where this is not inconsistent with public delivery), so that their magnitude can be modulated contingent on others' degree of matching—a pattern that reduces the opportunity for free riding. An evolved moral sentiment that generates a negative reaction to reclaiming benefits already delivered to kin acts like a valve that continuously invites efforts upwards through matching: Once a benefit is given, others must match it, or their failure to do so will establish the future collective ceiling below the optimum.

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Jones's punchline is in fact the last sentence of his article: "But I suggest that we can only appreciate the full scope of the theory of kin selection when we move from treating reciprocity and nepotism as mutually exclusive alternatives to considering the many ways in which reciprocity and coercion can act as amplifiers of nepotism." The first half of the sentence is a throwback to the silly debate between "descent" and "alliance" theorists of the 1950s and 1960s, which, I should hope, has been laid to rest long ago. The second half is a precise summary of a theory of human sociality I explicitly developed some 20 years ago in two books (van den Berghe 1979:14-16, 1981:7-11) devoted respectively to human systems of kinship and marriage and to ethnic relations, two of the three applications presented by Jones.

The question, then, becomes, What does Jones's concept of "group nepotism" add to this triad of sociality mechanisms? Indeed, what is "group nepotism" if not a compound of all three: nepotism, plus reciprocity, plus coercion? Before we invent a hypothetical "group nepotism" distinct from the individual one and underpinned by murky "moral sentiments," the principle of parsimony dictates that we ask whether the mutually reinforcing effects of individual nepotism, reciprocity, and

coercion leave an unexplained residual. I have yet to see even suggestive evidence that they do.

To be sure, people have a capacity to invent and enforce rules that promote the fitness benefits of nepotism, reciprocity, and coercion and that enhance the reciprocal effects of these mechanisms for at least some members of their social group. We call these rules "culture," and they make up the jural structure of human societies. To be sure, we can manipulate, exaggerate, or even invent kinship; we can fake reciprocity, and we can disguise naked, coercive exploitation as benevolence. Our social games and contracts are partially autonomous from the underlying biological calculus of individual fitness maximization and even, occasionally, antithetical to it. Such is the nature of our dual evolutionary trajectory: biological and cultural. However, on parsimony grounds we must invoke group selection, as Jones's "group nepotism" seems to do, only if the three basic individual-level mechanisms leave something unexplained.

Let us take the same three applications of Jones: food (especially meat) sharing, systems of kinship and marriage, and ethnicity. Let us begin with the primordial gathering-hunting hominid group. They practiced nuclear-family inbreeding avoidance through adolescent dispersal, as do countless other social mammals. They hunted cooperatively and shared meat, as do most other social carnivores (e.g., orcas, canids, hyenas, lions). They exchanged mates between neighboring bands, as indeed do other large social mammals. With culture, this primordial group gradually led to much larger and more complex societies. If you keep mating with the boy or girl at the next waterhole, you soon form a breeding population, an *ethny*, bounded by endogamy and made up, over a few generations, of people who cooperate as kin, as mates, and increasingly as both. Group solidarity is, at once, an inextricable mixture of nepotism and reciprocity, with, so far, little coercion beyond age and sex differences.

These social ties, however, become quite weak and diffuse beyond a couple of hundred individuals. What to do if you want to form stronger, larger groups to compete successfully for scarce resources with conspecifics? You invent a system of kinship and marriage based, for instance, on unilineal descent and clan exogamy, as is characteristic of most pastoralist and horticultural societies, which typically number thousands of members. Now you marry outside your lineage and clan but within your *ethny*.

The lineage or clan becomes a kin group organized for the inheritance of property, the formation of extended households, and various other forms of collective action, and the other lineages and clans become partners in reciprocal ties of marriage, military alliance, and so on. After several generations of clan exogamy, your spouses and in-laws become kinsmen as well, and nepotism and reciprocity continue to be the two sides of the same fitness-maximization coin. If you want to make the system tighter yet, you pass a rule of preferential cross-cousin marriage, so that you now marry the closest kin of your generation outside your clan. At the highest level, the