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Incest Taboos and Kinship: A Biological or a Cultural Story?

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Turner, Jonathan and Alexandra Maryanski. 2009. *Incest: Origins of the Taboo.* Boulder, CO: Paradigm.

Wolf, Arthur (editor) and William Durham (editor). 2005. *Inbreeding, Incest, and the Incest Taboo: The State of Knowledge at the Turn of the Century.* Stanford, CA: Stanford University Press.

Sahlins, Marshall. 2013. *What Kinship Is … And Is Not.* Chicago, IL: The University of Chicago Press.

In most, if not all, societies, incest taboos -- perhaps the most universal of cultural taboos -- include prohibitions on marriage between parent and child or between siblings. This universality suggests a biological origin, yet the considerable variation across societies in the full range of prohibited marriage relations implies a cultural origin. Correspondingly, theories regarding the origin of incest taboos vary from those that focus on the biological consequences were marriage-based procreation allowed to include inbred matings, to those that focus on social consequences such as confounding social roles, especially within the family, or restricting networks of interfamily alliances, were marriages to take place between close relatives. For those focusing on the biological consequences, the sexual aversion hypothesis of the anthropologist Edvard Westermarck has played a central role through seemingly providing an empirically grounded, causal link from the phenomenal level of behavior to the ideational level of culture. Yet the matter is not so simple and requires rethinking of what we mean by kinship and how our ideas about kinship relate to the widespread occurrence of incest taboos and the extensive variability in their content.

KEYWORDS culture, Westermarck, incest taboos, kinship, sexual aversion, evolution

Introduction

The three books being reviewed here address two related topics: incest and kinship, but with very different emphases that are mirror-like images of each other. The first two books focus on the alleged causal connection between what is called the Westermarck Effect and the

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universal occurrence of incest taboos regulating marriages in human societies using a biological perspective, mentioning kinship only in passing. The third book focuses on kinship using a cultural perspective and only mentions incest taboos in passing.

The Westermarck Effect, so named by Robin Fox (1962), refers to the connection between sexual aversion and being raised together hypothesized by the Finnish anthropologist Edvard Westermarck (1891) in his monumental book, The History of Human Marriage. Westermarck believed that there is "innate aversion to sexual intercourse between persons living very closely together from early youth" (1891: 320), which, he claimed, is "the fundamental cause of the exogamous prohibitions" (1922: 191). Though his argument for the origin of the incest taboos was initially accepted, it was subsequently criticized heavily and by the 1920s was rejected (Wolf 1993). It has subsequently been revived as part of sociobiological and evolutionary psychology arguments aimed at showing that cultural phenomena such as incest taboos can be accounted for within a biological framework (e.g., Lieberman *et al*. 2003; Aoki *et al*. 2008). Whether the Westermarck Effect is valid, though, is still unresolved (see, for example, Leavitt 2007; Shor & Simchai 2009; Fraley & Marks 2010; Rantala & Marcinkowska 2011; El Guindi & Read 2012 for evidence questioning the Westermarck Effect) and its relationship (if any) to incest taboos is not yet resolved. Building support for the hypothesized relationship of the Westermarck Effect to incest taboos is the overarching theme of the authors for the first two of the three books discussed in this review article.

These authors consider, as compelling evidence for the Westermarck Effect, the implications of data on the divorce and birth rates in Taiwan for the Chinese form of *sim-pua* (minor) marriages in which a girl is adopted as an infant to later become the wife of the son with whom she is raised (Wolf 1966, 1995), the absence of marriages among Israeli kibbutzim children raised together (Shepher 1971), and the less successful marriages of paternal parallel cousins raised together in a rural Lebanese village in comparison to other marriages (McCabe 1983). However, negative evidence from groups such as the Samaritans, the Arapesh, the Angmaksalik Eskimo, the Chukchee (see discussion and references in Leavitt 2007), the Zikri Baluch of Pakistan (Pastner 1986), and Moroccan males (Walter & Buyske 2003), among other groups, that counter the claimed validity of the Westermarck Effect is not discussed by these authors.

The evidence they do cite is taken as providing an unequivocal biological underpinning for the origin of incest taboos in human societies. For these authors, the issues at hand do not relate to the empirical validity of the Westermarck Effect, but to the content of arguments regarding how and why aversion became institutionalized culturally as incest taboos. Collectively, these authors address (though in different ways) nontrivial issues involved in trying to invoke phenomenally expressed biological behavior as the causal basis for an ideationally formulated cultural construct.

The first two books are complementary in their respective discussions of the Westermarck Effect and its relationship to incest taboos. They form a pair that contrasts with the third book by each presenting arguments regarding kinship and incest taboos that assume the central importance of a biological framework for understanding the presence of incest taboos in human societies, with kinship, even as it is culturally expressed, playing a secondary and supporting role. The third book takes the opposite stance and focuses on the presumed central

importance of understanding kinship from a cultural perspective, with incest -- and by implication, biology -- playing a secondary and supportive role. This contrast in the relationship between incest and kinship in these two sets of books is not one of nature versus nurture, though, but whether the phenomena in question -- kinship and incest taboos -- are better understood by reference to our biological heritage as a species or to the cultural framework that came into play during the evolutionary development of our species. To their credit, while the various authors work from different premises, none reduces the complexity of cultural phenomena to a one dimensional biological account nor dismisses the complexities of biological kinship through a simplistic representation of kinship as being divorced from a biological foundation.

Briefly, the book by Turner and Maryanski is written for a general audience. It consists of seven chapters that provide a historical overview of theories for the origin of incest taboos, evidence for variation in the degree to which the taboos are expressed in mother-son, father-daughter and brother-sister dyads, comparison of human behavior to outbreeding behavior patterns among the non-human primates, and, in their view, the causal importance of the development of the nuclear family during human evolution as the main impetus for the introduction of incest taboos into human societies.

The second book, edited by Wolf and Durham, is based on a conference held at Stanford University in 2000 and includes ten chapters with topics ranging from a review of the logic of the causal argument linking the Westermarck Effect with the incest taboos -- an argument that necessarily begins at the empirical level of biological observations and ends at the ideational level of cultural observations -- to whether outbreeding behavior among human is biologically grounded or learned, as well as several empirically oriented chapters. These include a chapter that compares outbreeding in non-human primates with incest avoidance in human societies, a chapter that reviews the biological costs of inbreeding and why social and environmental factors should also be included when determining the "costs" of inbreeding, and a chapter discussing clinical evidence regarding the dysfunctionality of families in which sexual incest has taken place. Several of the chapter authors discuss the implications to be drawn from the data sets cited as evidence for the Westermarck Effect in human societies. Except for Durham, the authors of the chapters in this book collectively agree that the Westermarck Effect provides an adequate accounting for the presence of incest taboos in human societies through selection for inbreeding avoidance. Durham, alone, considers an alternative possibility, namely that the incest taboos derive from people being aware of the deleterious effects associated with inbred matings.

The third book, by Sahlins, is short and consists of just two chapters, the first of which is the revision of a two-part article published in the *Journal of the Royal Anthropological Institute* in 2011. The first of these two chapters focuses, as indicated by the initial part of the book title, on what constitutes kinship in human societies and the ways in which kinship is culturally expressed. The second chapter takes up the latter part of the title and presents Sahlins' reasons for why kinship in human societies cannot be considered to be biological phenomena. Sahlins only mentions incest taboos in passing, taking it for granted that the taboos are cultural, not biological, phenomena.

In the remainder of this review, I first discuss and evaluate the argument presented in the first two books for causally linking incest taboos to biological origins through the Westermarck Effect and then I review the argument presented in the third book by Sahlins on the nature of

kinship. I then critique the interpretations made of the evidence advanced in support of the Westermarck Effect. Finally, I conclude by suggesting that a more encompassing argument may be obtained by embedding the discussion about the origins of the incest taboo and the nature of kinship into an evolutionary account of the transition from an essentially biological foundation for societal systems among the non-human primates to the culturally mediated foundations for human social systems (see Read 2012b).

The Origin of Incest Taboos Through the Nuclear Family?

Though the authors of the first two books (excepting William Durham) accept the Westermarck Effect as the causal basis for culturally formulated incest taboos, they differ in their views regarding how this came about. Turner and Maryanski present in their book an evolutionary scenario based on a cladistic account of inbreeding avoidance among the non-human primates that sets the stage for addressing what they consider to be three critical questions regarding the incest taboos: (1) Why is the mother-son taboo seen as stronger than the father-daughter or sibling-sibling taboo? (2) Why does mother-son incest occur much less frequently than father-daughter or sibling incest? and (3) Why is the psychological harm associated with violation of the mother-son incest much more damaging than violation of the other forms of incest? (TM, pp. 50-51). .

Turner and Maryanski begin with a historical review of various explanations offered for the presence of incest taboos, especially the19th century sociological arguments asserting that without the incest taboo the cohesion of the nuclear family would be challenged through role confusion: a man having sexual relations with his daughter would be taking on both the asexual role of father and a sexual, spouse-like role towards his daughter; similarly for the other forms of incest within the nuclear family. Turner and Maryanski do not reject these explanations, but consider that none of them is sufficient for answering their three questions.

Instead of relying on what they call incomplete sociological arguments, Turner and Maryanski argue, instead, that incest taboos arose during the transition from the social organization of the early hominins, as determined from their cladistic account, in which social relations were "typified by weak ties among adults, high levels of individualism, and mobility among loosely organized foraging parties" (TM, p. 121), along with male phylopatry and social organization built around ties connecting nuclear families. Among the non-human primates, they point out, inbreeding avoidance is due to both biological mother/biological son imprinting and sex biased philopatry, with females leaving their natal group upon reaching puberty among the great apes and males being the migrating sex for most monkey species. Because, they argue, evolutionary changes among the hominins led to nuclear families coupled with philopatry for both sexes beyond pubescence, conditions favoring selection for the Westermarck Effect would be in place since transfer of females at puberty to another group would now be disrupted, thereby introducing the risk of biological sibling-sibling matings.

A key component in their argument for the subsequent development of culturally expressed incest taboos involves the consequences of the transition from the weak social ties of the early hominins to the strong social ties associated with the nuclear family that "emerged, no doubt, as a way to increase social solidarity and ensure fitness of offspring" (TM, p. 158). The

transition to social organization based on nuclear families and its attendant social solidarity depended, they point out, on neurological changes, especially those related to the expression of emotions. These neurologically based emotional changes would have made incestuous sexual relations within the family more likely, they assert, if they were without a countervailing constraint. While biological mother/biological son imprinting may still have sufficed to prevent matings between these pairs even after these changes had taken place, the emotional ties of the nuclear family implied, they claim, that "a Westermarck Effect alone was probably insufficient to fully dampen emotionally bonded individuals in whom love and sex had become intertwined" (TM, p. 172). In addition, post-pubescent biological daughters would now be in contact with their biological fathers, hence unconstrained sexual behavior would lead, they suggest, to inbreeding between them. The Westermarck Effect, by itself, would have had little effect on the occurrence of biological father-biological daughter matings, they assert, without the development of culturally expressed incest taboos and so "the incest taboo as a cultural force supplemented biologically based avoidance patterns" (TM, p. 122). Thus, they argue, there had to be a transition from biologically based inbreeding avoidance behavior to avoidance of inbreeding through cultural incest taboos: "There can be no doubt that the incest taboo was created to prevent incest" (TM, p.157). However, their certainty may be premature.

A Causal Connection Between the Biology of Sexual Aversion and the Culture of Incest Taboos?

In contrast to the certainty of Turner and Maryanski with regard to their evolutionary account connecting the risk of incest to the incest taboos, the authors of the chapters in the book edited by Wolf and Durham recognize that there are epistemological and philosophical issues involved when trying to causally connect the biological sexual aversion that is a key part of the hypothesized Westermarck Effect with culturally expressed incest taboos. As discussed by Durham (and elaborated on by Wolf in his Introduction to their edited book), there are three issues that must be resolved affirmatively before the Westermarck Effect can be accepted as the causal basis for the incest taboos: (1) Does early childhood association lead to sexual aversion?, (2) Is sexual aversion an adaptation whose function is to reduce inbreeding?, and (3) Does sexual aversion lead causally to the formation of incest taboos? Regarding these questions, we will find it useful to characterize the issue being recognized and addressed according to whether the evolutionary transition from the phenomenal level of inbreeding avoidance through aversion to the ideational level of marriage prohibitions expressed as incest taboos is continuous (see Figure 1A), or whether it is analogous to the discontinuity of a phase transition going from one form of organization to another (see Figure 1B). All of these authors assume the evolutionary transition is continuous.

With regard to the causal problem identified by Durham, both the conceptual difficulties with the causal transition required for the phenomenal/ideational distinction central to Durham's third issue and the lack of empirical evidence for such a connection are considered by chapter authors. The causal transition is foregrounded and then dismissed in the chapter by Patrick Bateson. Bateson foregrounds the causal transition problem by pointing out that *inbreeding avoidance*, which we share with other animals, refers to behavior directly reducing the likelihood

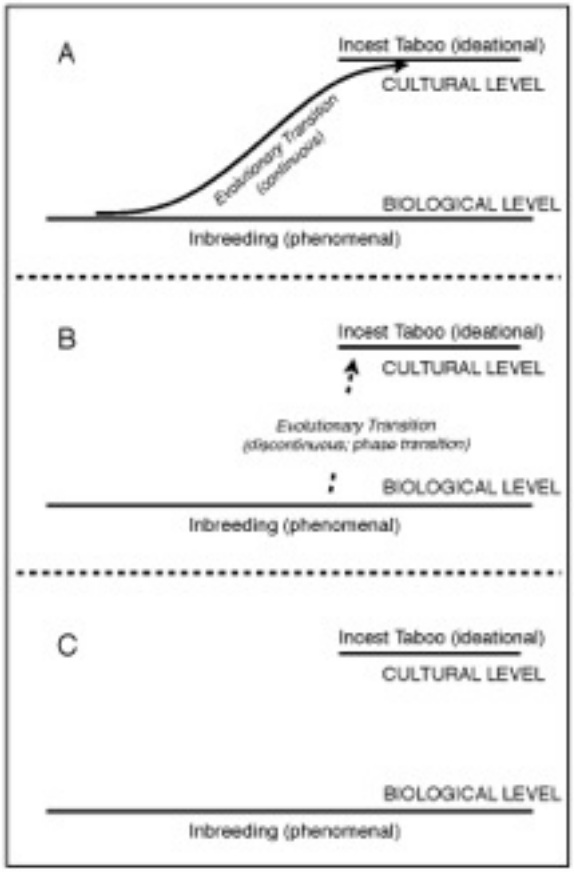

Figure 1: Three models the for transition from the biological level (inbreeding avoidance) to the cultural level (incest taboos). A: Continuous transition. B: A discontinuous transition, phase transition. C: No transition; cultural level is *sui generis* (self generated without empirical constraint).

of mating between biologically related individuals, whereas *incest taboos* refer to uniquely human "culturally transmitted proscriptions [that] limit sexual contact and marriage with close kin" (WD, p. 24), hence the required causal transition from behavior to ideas. He then dismisses the causal transition problem because, he argues, it "did not arise historically from deliberate intention to avoid the biological costs of inbreeding" (WD, p. 35, *contra* the argument by Durham discussed below), but from convergence between two trends, one biological and the other cultural (see Figure 1A). However, Bateson does not answer why there was convergence and how that led to incest taboos.

The causal transition problem is also taken up in the chapter by Neven Sesardic. Sesardic resolves the problem through positing that individuals experiencing the aversion stipulated in the Westermarck Effect may very well sense that it has to do with sexual relations between biological kin, thereby the causal connection between the phenomenal level and the ideational level is made through the interpretations of those experiencing the aversion. His argument, it

should be noted, underscores the fact that cultural phenomena are neither simply the extension of, nor emergent from, behavioral patterns, but depend on human agency having the cognitive capacity to conceptually connect the phenomenal level of behavior to the ideational level of culture.

Attributing the causal connection to human agency still leaves unanswered the empirical disconnect between these two levels in ethnographic observations. Ethnographic observations, according to Durham, do not establish a connection between aversion and incest taboos, as would be expected if the Westermarck Effect were causally related to the origin of incest taboos. Minimally, Durham observes, not all aversions led to taboos, hence he rhetorically asks why this aversion should lead not only to incest taboos, but also to moral indignation when the taboo is violated. This moral and ethical dimension is taken up in the chapter by Larry Ardhart, who sees a connection between the Westermarck Effect and, more generally, a science that incorporates human ethics within its scope.

Durham also refers to the fact that incest taboos do not refer solely to individuals raised together, the topic of the Westermarck Effect, but may also apply to those recognized as kin (regardless of their actual biological relationship to each other, if any) yet have had little or no contact with one another. The latter, he points out, led Westermarck to add an "extensionist hypothesis" to his claim, analogous to the extensionist hypothesis used to account for the same kin term in classificatory kinship terminologies applying to both close and distant genealogical relations. As Westermarck put it: "though in the first place associated with kinship because near relatives normally live together, [incest taboos] have come to include relatives who do not live together" (Westermarck 1891: 114, quoted in WD, p. 125). However, like the extensionist hypothesis invoked for kinship terminologies, Westermarck provided no reason for the extension to occur in the first place.

In addition, Durham points out, cross cultural data do not support the claim that aversion leads to incest taboos and moral disapproval: "There is just no evidence … that the moral disapproval … is based on Westermarck's aversion" (WD, p. 126). Given the lack of empirical evidence linking aversion to the moral disapproval associated with the incest taboos, Durham offers an alternative argument that traces back to the psychiatrist Roger Burton: the deleterious effects of close inbreeding would have been observed and connected with mating between biologically close relations, hence to its prohibition through incest taboos. Durham offers the alternative explanation mainly as a way to open discussion of whether the deleterious effects of inbreeding can be connected to incest taboos by a route other than the one laid out by Westermarck.

Implicit in Durham's argument is the widespread assumption that the deleterious effects associated with inbred matings will lead, minimally, to selection for inbreeding avoidance behavior, a behavioral pattern Anne Pusey documents for the non-human primates in her chapter on primate mating behavior, and maximally, to selection for cultural norms expressed as incest taboos, as is assumed by Turner and Maryanski. However, the genetic connection between the expression of deleterious, recessive traits and selection for behaviors that lead to inbreeding avoidance (let alone taboos as cultural norms) is not a simple one.

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Behavioral Basis for Outbreeding

First of all, there are at least three biologically based behavioral means by which outbreeding takes place. To begin with, in any species for which there is extensive parenting/ caregiving, there may be selection of "hard-wired" sexual avoidance between caregiver and recipient through imprinting, a pattern that appears to be present in most primate species for a biological mother and her male offspring (see Table 3.1 in the chapter by Pusey). Turner and Maryanski refer to sexual avoidance through imprinting between male offspring and biological mother as part of the answer to their questions.

Next, sex biased philopatry made active at the time of puberty will indirectly exclude mating with biological kin belonging to the migrating offspring's natal group without requiring biological kin recognition and, as discussed by both Pusey and Turner and Maryanski, is the primary means by which non-human primates engage in outbreeding. It only requires "hardwiring" for the behavior of leaving one's natal group for its implementation, not hardwired sexual avoidance between biological brothers and sisters, as is alluded to by Turner and Maryanski despite their disclaimer that evidence for this hardwiring is "not without gaps and ambiguity" (TM, note 3, Table 4).

Yet another means by which outbreeding behavior arises is for offspring raised together to lack sexual interest in each other, a pattern documented in some mammals with multiple births. Among primates in the wild, though, sex biased philopatry makes it unlikely that biological siblings will be in the same group after reaching puberty, but within captive groups, maternal siblings now in contact with each other have reduced mutual sexual interest, whereas paternal siblings, who are less likely to interact with each other than maternal siblings, do not (see P, Table 3.1). Reduced sexual interest is not, however, expression of the Westermarck Effect, as the latter posits that offspring raised together will have sexual *aversion*, not just *indifference*. Aversion is necessary for claiming a causal basis for the origin of incest taboos, as it would be extremely difficult to construct a convincing causal argument that begins with indifference and ends with the moral imperatives associated with the incest taboos.

Genetic Consequences of Inbreeding

In addition, along with the multiple ways by which behaviors can lead to inbreeding avoidance, the genetic consequences of inbreeding are multifaceted. To see this, a brief sidebar is needed to clarify the genetic relationship between inbreeding and inbreeding depression, with the latter primarily the consequence of recessive deleterious alleles expressed through homozygous genotypes arising from matings between biologically related individuals (Charlesworth and Willis 2009).

SIDEBAR: If we assume (for simplicity and without loss of generality) that the deleterious alleles are mutually independent, we can refer to the pooled frequency, $1 - p$, of the recessive deleterious alleles in a breeding population rather than to the frequency of each deleterious allele. Also, assume for simplicity that the recessive deleterious alleles are lethal. Under random mating, which will include matings between biologically related individuals in

any finite population, recessive deleterious alleles are, on the one hand, removed from the population at a rate proportional to $(1- p)^2$, the rate of occurrence of, homozygous genotypes for the deleterious alleles under random mating, and, on the other hand, reintroduced through the mutation rate, μ, for recessive deleterious alleles. Let $1 - p^*$ be the equilibrium frequency for the recessive deleterious alleles that arises when the mutation rate equals the selection rate; that is, when $\mu = (1 - p^*)^2/2$ (since each lethal homozygote removes two deleterious alleles).

Now assume inbreeding takes place, meaning that matings between biologically related individuals occur more frequently than is the case under random mating, while keeping the mutation rate constant. With inbreeding, the rate of production of homozygous genotypes increases, leading to increased selection against the recessive deleterious alleles, thereby reducing their frequency until a new equilibrium value, $(1 - p^{**}) < (1 - p^*)$, is reached. At this new equilibrium value, $1 - p^{**}$, homozygous genotypes will be produced under inbreeding at the same rate that homozygous genotypes were produced under random mating with allele frequency $1 - p^*$ since the mutation rate has not changed. Thus, at genetic equilibrium, the rate of expression of deleterious traits through the production of homozygous genotypes is *independent of the mating pattern*. What differs is the equilibrium frequency for the recessive alleles, not the rate of expression of deleterious traits in a population. Consequently, over evolutionary time scales sufficient for breeding populations to reach equilibrium, the magnitude of the so-called "harmful effects of inbreeding" averaged over the population members is determined by the mutation rate, μ, for the deleterious recessive alleles, not the genetic relatedness involved in mating. What is usually meant by inbreeding depression is the initial, increased expression of recessive deleterious traits due to newly introduced inbreeding in a previously outbred population and before genetic equilibrium is reached. END OF SIDEBAR

Equilibrium Conditions and Inbreeding Avoidance

Under equilibrium conditions, the extent to which the expression of deleterious alleles through homozygosity leads to selection for inbreeding avoidance behavior depends on the relative cost of its implementation. With sex biased philopatry, the cost includes the risk of mortality for the migrating sex, the probability of failing to find a mating partner, and for species with female philopatry where infanticide may be part of the reproductive strategy of migrating males, the risk that one's offspring are subsequently killed through infanticide by other migrating males, and so on. With the non-human primates, the ubiquity of sex biased philopatry suggests that the cost of dispersal is less than the cost of inbreeding without dispersal, through there may, in some cases, be selection for sex biased philopatry other than as a strategy for inbreeding avoidance. Regardless of its cause, though, the presence of sex biased philopatry among the non-human primates implies they are outbred in the wild, implying that they have a relatively high equilibrium frequency $1 - p^*$ of deleterious recessive alleles. With a high equilibrium frequency, the introduction of inbreeding would initially increase mortality rates among the offspring of inbred matings substantially.

This implication is supported by data on twelve, captive non-human primate species with recently introduced inbred matings (resulting from the shift to captivity), with captivity making impossible outbreeding through single sex phylopatry (see discussion in Ralls *et al*.1988). For

these species, the average inbreeding cost, c, determined from the mating patterns in captivity and then extrapolated to matings between first-degree biological relatives (with F = 0.25, where F is the coefficient of biological relatedness between the two mating individuals), is $c = 0.40$ ($s = 0.27$, $n = 12$; statistical results here and below computed from data in Table 3 in Ralls *et al*. 1988). This implies a 40% higher mortality rate for matings between first degree biological relatives than for outbred matings where F = 0.0. The inbreeding cost can also be expressed through the average number of lethal gene equivalents per zygote. For these primate species, the mean number of lethal equivalents is 5.4 per zygote ($s = 5.74$, $n = 12$).

Genetic Cost of Inbreeding

For humans, the genetic cost of inbreeding is low in comparison to the non-human primates. As discussed by Alan Bittles in his chapter on the biological consequences of inbreeding for humans, the number of lethal gene equivalents for humans is 1.4 and for first cousins (F = 0.0625) the inbreeding cost is $c = 0.044$, which corresponds to an inbreeding cost of $c = 0.174$ when F = 0.25. Thus the frequency of recessive deleterious alleles (measured by lethal gene equivalents) is about 4 times greater in the non-human primates in comparison to humans and the inbreeding cost in the non-human primates is about twice the inbreeding cost in human matings, thereby implying that humans had a past genetic history of being more inbred than the non-human primates. This conclusion is consistent with recent DNA data showing the high degree of inbreeding among the Altai Neanderthals of Siberia (Prüfer *et al*. 2013), neurocranial abnormalities in Late Pleistocene Homo cranial material in northern China indicative of inbreeding (Wu *et al*. 2013), and the degree of genetic relatedness found in some Upper Paleolithic burials (references in Wu *et al*. 2013). Thus the genetic data suggest that human populations have a genetic history of being inbred, thereby leading to a relatively low frequency of deleterious traits in comparison to the non-human primates, as shown by the substantially lower inbreeding cost for humans in comparison to the non-human primates. Whatever may be the effect of incest taboos on the rate of matings among human biological kin, then, the incest taboos have only had a weak effect, at most, in introducing inbreeding avoidance into human populations in comparison with the high degree of outbreeding among the non-human primates arising from single sex phylopatry.

The conceptual difficulties in causally linking inbreeding behavior to culturally framed incest taboos and associated moral repugnance are recognized, but not resolved, then, by the arguments and evidence presented by this group of authors. Part of the difficulty lies in the assumption that cultural constructs develop out of behaviors and not the reverse. Thus Arnhardt assumes in his chapter that we have biologically grounded behavioral propensities for mating behavior and the cultural implementation through marriage becomes its specific expression. Similarly, Turner and Maryanski comment, regarding the cultural institution of marriage: "males and females formed more permanent pair bonds (*that eventually became enshrined in marriage rules*)" (TM, p. 159, emphasis added), thereby assuming causality goes from already existing behaviors to cultural constructs said to encompass those patterns, but the matter is not so simple.

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Kinship Identity Given Through Incest Taboos?

The Western assumption that pair bonding through an emotional attachment is a desired prerequisite for marriage is not a cultural universal. Even in western societies, marriage is not just the cultural acknowledgement of an emotional attachment between the bride and groom, but is the means by which the biological birth of a child is transformed, as discussed by Sahlins in his book being reviewed here, into the cultural instantiation of kinship relations established through marriage that establishes the social identity of an offspring: "children are conceived … from the 'blood' of the mother and the 'sperm' of the father, [yet] these are not mere physiological substances of reproduction but meaningful social endowments of ancestral and affinal identities and potencies. … It follows that what is reproduced in the birth is a system of kinship relations and categories in which the child is *given* a specific position and positional value" (S, p. 66, emphasis added). The key word is *given*, implying that the kinship relations are not simply epiphenomena deriving from sexual relations leading to conception and sanctioned by marriage initiated through pair bonding, but the *raison d'être* of marriage in the first place.

For Sahlins, the critical aspect of marriage is not its potential for prohibiting inbred matings through incest taboos, but the kinship relations created through the sociological decision of who will marry whom that establishes the kinship position of an offspring in an ongoing field of kinship relations. These kinship relations, according to Sahlins, are not simply the consequence of marriage and birth in the way that biological kin relations are the outcome of mating leading to biological reproduction: "kinship is the *a priori* of birth rather than the sequitur" (S, p. 68). According to Sahlins, the decisions that are involved are necessarily social and not just individual, hence incest taboos are not simply a cultural means to implement inbreeding avoidance behavior as an individual act, but, as he states, they are part of forming the social context into which a newborn is being introduced. The kinship social context is constructed, in part, then, by incest taboos. Rather than kinship being "generalizations of so-called 'primary' relations of birth," it is formed by "differentiation of the field of communicable others--cum--sociological similars; *as by the institution of the incest tabu*" (S, p. 43, emphasis added). And rather than having the primary biological function of preventing mating between biological kin, Sahlins sees the incest taboo as having the sociological function of forming the position of a newborn in the ongoing field of kinship relations in a consistent manner, hence without inherent internal contradiction. Though not discussed by Sahlins, the field of kinship is expressed through the structure determined by the kin terms making up a kinship terminology and their interconnections (Read 2007).

Sahlins takes it for granted that incest taboos are not primarily about regulating the biological consequences of inbreeding within the nuclear family (though inclusion of family relations within the scope of incest taboos has that as a consequence), but relate to the structure and organization of the cultural domain of kinship relations, as can be seen in his reference to ethnographic observations about the Toraja of Sulawesi in Indonesia: "Separated in kinship origins by the incest tabu yet intensely joined by sexuality …" (S, p. 48), or to the Manambu of the Sepik region of New Guinea: "Given the incest tabu, brothers-in-law (and their respective people) are related to one another through a woman who is sister to one and wife to the other" (S, p. 54, with reference to Viveiros de Castro 2004), or to kinship systems that consider parallel

cousins to be siblings and cross-cousins to be affines: "Given the incest tabu, the child has the same maternal blood as her mother's sister's children, but not her mother's brother's children, since they have a different maternal source …. Thus, cross-cousins would not be the 'consanguineal' relatives they appear to be in our misleading kinship diagrams and genealogical notions (Dumont 1953, 1963)" (S, p. 76). In these examples, Sahlins takes it for granted that the functionality of incest taboos relates to the structure of the culturally prescribed domain of kin and is expressed through the formation of the place of a newborn in that structured domain by permissible and non-permissible marriages; that is, by incest taboos.

What it means to be kin is the main theme of Sahlins' book and being kin, he argues is constituted by *mutuality of being*, which includes the idea that one's identity can only be fully understood by also incorporating into that identity those who are recognized as kin and, conversely, kin are formed through culturally identified conditions by which mutuality of being is established, of which birth is only one modality: "kinsmen are persons who belong to one another, who are co-present in each other, whose lives are joined and interdependent" (S, p. 21). At first glance, it might appear that the same could be said of biological identity since we are the consequence of joining a gamete from a male and a female, and this ancestral and dual nature of our biological identity extends to our cognitive/psychological identity as well, insofar as the latter is framed by the transmitted genetic information. This, however, is not what Sahlins is arguing. The schema for Sahlins' argument is that of Figure 1B, not 1A. What exists at the cultural level, he argues, is not what initially exists at the biological level and is then changed continuously through evolution to become part of the (cultural) ideational level (see Figure 1A). Instead, the ideas that groups have developed as part of their cultural domain are of a different character, hence the phase transition of Figure 1B.

Sahlins makes the distinction explicit by pointing out that the common, anthropological reference to "their theory of procreation" is a misnomer, as, he says, that assumes we are all universally engaged in trying to understand the biological processes involved in procreation. Instead, it is not "as if these were so many mistaken ideas of the physiology of conception … people got the facts of life wrong" (S, p. 74), but rather that these are part of their articulation of what they have determined to be the facts of procreation: "For the peoples concerned they are not theories but the known facts of life" (S, p. 77, emphasis in original); thus, as shown in Figure 1B, although our biological heritage is carried forward to the present, what has been built culturally is not the extension of that biological heritage to the cultural level, but a discontinuous transition in which the cultural outcome cannot be predicted from the properties of that biological heritage. Claude Lévi-Strauss made much the same argument over a half-century ago: "Culture is not merely juxtaposed to life [read: nature] nor superimposed upon it, but in one way serves as a substitute for life, and in the other, uses and *transforms it, to bring about the synthesis of a new order*." (Lévi-Strauss 1969[1949]: emphasis added).

Sahlins then asks rhetorically: "What if the mother's blood were the blood … of her lineage, and what if the father's semen came from the soil of the clan?" (S, p. 74) and the answer, I suggest, can be found through the method articulated by Schneider: "*(t)he first task of anthropology,* **prerequisite to all others***, is to understand and formulate the symbols and meanings and their configuration that a particular culture consists of*" (Schneider 1984:196, emphasis and bold in the original). Though for some this leads to a constructivist approach to

kinship built out of practice and without any preconditions or constraining structural order (see Figure 1C), Sahlins rejects the constructivist approach as replacing an erroneous biological view of kinship with yet another erroneous view of kinship, for "Privileging the realities of practice over the 'essentialisms' of structure … threatens to leave kinship in that limbo of indeterminism where postmodernism habitually came to rest" (S, pp. 9-10). Instead, he suggests, the dichotomy of "pure 'biology' to pure performance" (S, p. 28) disappears since mutuality of being incorporates the various ways that "kinship may be constituted, whether natally or postnatally … [and] all means of constituting kinship are in essence the same" (S, pp. 28-29), thus the fiction of fictive kinship, thereby leaving a "kinship whose elementary forms are relationships … [forming] [a] socially constituted network of relationships between persons and among groups ... [in which] the 'extension' of kin terms beyond so-called primary relations is always already built into the relations of reproduction" (S, pp. 66, 68; see Read 2007 for a formal account validating Sahlins' claim). Yet while acknowledging the "relations of reproduction," Sahlins maintains that "kinship is culture, all culture" (S, p. 89).

What precisely Sahlins means by the latter is not made clear, for he rejects both the constructivist approach of grounding kinship solely in practice (see Figure 1C) and the biological claim that kinship is the wider expression (even if culturally formulated) of the consequences of procreation (see Figure 1A). However, the remaining possibility (see Figure 1B) does not assume that kinship is purely cultural; rather, it stipulates that kinship has a precursor, biological foundation, yet is cultural and thereby made discontinuous with that biological foundation through the evolutionary development of kinship as a cultural idea system (Read 2012b) with its own logic and structure (Leaf & Read 2012). Kinship, then, in Sahlins' view is not simply an extension of, or elaboration on, relations and behavior already present at a biological level, even if in rudimentary form, as is often incorrectly assumed (see, for example, the criticism of Thompson [2012] in Read [2012a]). For this reason, a paradigm shift is involved when kinship is viewed analytically in its own right (in keeping with Schneider's "prerequisite") using the kinship ideas of a group expressed formally through the structure, organization and logic of a kinship terminology (Read 2007). As implied by Sahlins' arguments, the structure and logic in question is not that of an underlying biology given cultural expression, but of kinship ideas that are, by virtue of being systems of indigenous ideas, neither definable through, nor predictable from, their biological precursors (though they can be traced back evolutionarily to those biological precursors) in the way that incest taboos for family relations are supposedly predictable from their biological precursor of inbreeding avoidance behavior according to the first group of authors.

Do the Data Provide Support for the Westermarck Effect?

The interpretations made of the three data sets cited in support of the Westermarck Effect would seem to contradict the genetic evidence discussed above that suggest lack of outbreeding in the genetic history of humans. A review of these interpretations (El Guindi & Read 2012), though, indicates that the claimed evidence for sexual aversion as the outcome of close, early childhood co-socialization is not clear-cut and may be faulty. Consider each of these data sets in turn, along with the other data sets mentioned by the authors from the first two books.

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(1) Chinese *Sim-Pua* Marriages Force Violation of Brother-Sister Incest Taboos

Consider the Chinese *sim-pua* marriages discussed by Wolf that occurred in Taiwan (until the 1970s) between a boy and a girl adopted by his parents to be his future wife. For these marriages, Wolf finds higher rates of divorce and extramarital affairs than in the regular (major) marriages between a boy and a girl. Wolf attributes the comparatively lower rate of success of the *sim-pua* marriages to each of the boy and his adopted sister supposedly having an aversion to sex with the other due to the Westermarck Effect. Leavitt (2005) has suggested, however, that socio-cultural factors such as "the harsh treatment of *sim pua* brides, and the low status of minor marriage, which commonly includes strong social ridicule (Leavitt, 2005: 193–211)" (Leavitt 2007: 400) have not been taken into account (but see Wolf 1993).

Nonetheless, even if Wolf's analyses are accepted at face value, not included as a causal factor, yet negatively affecting the marriages, are the consequences of the adopted daughter and the son being raised together as sister and brother and not as future wife and husband (Wolf 1970: 504). Apparently they are only told that they are not brother and sister about the time the marriage is to be consummated (Wolf 1970: 508). Because they are raised together as brother and sister, the marriage requires them, from their perspective, to violate cultural taboos against brother-sister marriage, thereby setting into motion conditions such as engaging in sexual relations that are akin to the involuntary incestuous sexual relations known to cause severe psychological problems, as discussed by Turner and Maryanski. The possible negative affect of entering into what the participants may believe to be an incestuous relationship is also supported by the data Wolf provides in his chapter on the *sim-pua* marriages (after correcting for a conceptual error in his computation of a Divorce/Fertility Index, discussed below).

Like the pattern of a discontinuity at age 3 that Wolf (1993) discussed for divorce rates associated with the age of the girl at time of adoption, these data, for the cohort of girls adopted at age 0, show discontinuity at age 3 for the subsequent divorce rate associated with the age of the boy at the time of adoption. For the boys from 0 - 3 years of age at the time of adoption -- an age range during which neither the girl adopted at age 0 nor the boy would remember the adoption event due to childhood amnesia -- there is, from a statistical viewpoint, no change in the subsequent divorce rate (see the statistically horizontal regression line on the left side of Figure 2 and the caption for Figure 2). For the boys greater than 3 years of age at the time of adoption, when the boy would now be increasingly more likely to remember the adoption event with greater age, there is a constant and significant decrease in the divorce rate associated with the age of the boy (see the downward sloping regression line in Figure 2).

This discontinuity in the rate of change in the subsequent divorce rate associated with the age of the boy at the time of the adoption event supports the argument being made here that the *sim-pua* marriages are less successful due to involuntary violation of the incest taboo rather than to the alleged Westermarck Effect. If the less successful *sim-pua* marriages were due to triggering the Westermarck Effect by the boy and adopted girl being raised together, then there should be a gradual decrease, starting with boys at age 0 at time of adoption, not a discontinuity, in the lack of success of the *sim-pua* marriages, since the length of time the boy and adopted girl

are raised together decreases continuously with the age of the boy for the cohort of girls adopted at age 0.

Conceptual Error in the Divorce/Fertility Index

The conceptual error in the Divorce/Fertility Index occurs when Wolf adjusts the marital fertility rate = (total number of births)/(total number of marriage years) to take into account the number of divorces experienced by the women in his data set. He does this by "subtracting from the numerator of the marital fertility rate five births for each divorce," where five is "chosen as a rough estimate of the number of children women who were divorced would have borne if they had not been divorced" (WD, p. 79). Considering this correction, he computes: Fertility/Divorce Index = (total number of births - 5 × [number of divorces])/(total number of years of marriage). Conceptually what is being measured by this calculation is not clear. Why five births for each divorce are subtracted, rather than added, is not evident since Wolf says he is trying to take into account births that did not occur because of divorce. However, even if one adds the missing births due to divorces instead of subtracting, the number of years of marriage also needs to be increased to take into account the number of missed years of marriage due to divorces. Assuming the purpose of his corrections is just to correct the fertility rates for the number of divorces, his calculation should be: Fertility/Divorce Index = (total number of births + 5 × [number of divorces])/(total number of years of marriage + n × [number of divorces]), where n is the average number of missed marriage years from the divorce until menopause.

Correction of the Divorce/Fertility Index

We can correct his calculation of the Divorce/Fertility Index from the data he presents by working backwards from his Tables 4.1 - 4.4 and computing the age specific number of divorces used to generate Tables 4.2 and 4.4. Correcting his Index calculation, however, would have no effect if age corrected fertility rates are constant and would have only a small effect when age corrected fertility rates are not constant. For this reason, instead of correcting his Index, I will use the age specific number of divorces to measure the effect of age at adoption for the boy, keeping fixed the age of adoption for the girl, on the divorce rate.

From the age specific divorce rates, we can compute the divorce rate per marriage year, varying the age of first association for the boy but keeping the age of the adopted girls at age 0. (Ideally we should do this for each age for the adopted girls and not just for age 0, but Wolf only provides data for girls adopted at age 0.) The result is shown in Figure 2. Figure 2 shows that there is no change in the divorce rate for the cohort of boys 0 - 3 years of age at the time of association with the girl adopted at age 0. Childhood amnesia implies that boys in the 0 - 3 age range and girls adopted at age 0 would not remember the adoption event and so they would have no reason not to believe, as they were growing up, that they were brother and sister, given that they were raised together as if they were brother and sister. Beyond 3 years of age, the divorce rate decreases linearly with the age of the boy, suggesting that with increasing age at time of adoption, the older boys increasingly remember the adoption event and so are more likely to be aware that the girl is adopted and not a biological sister, in which case the imposed marriage

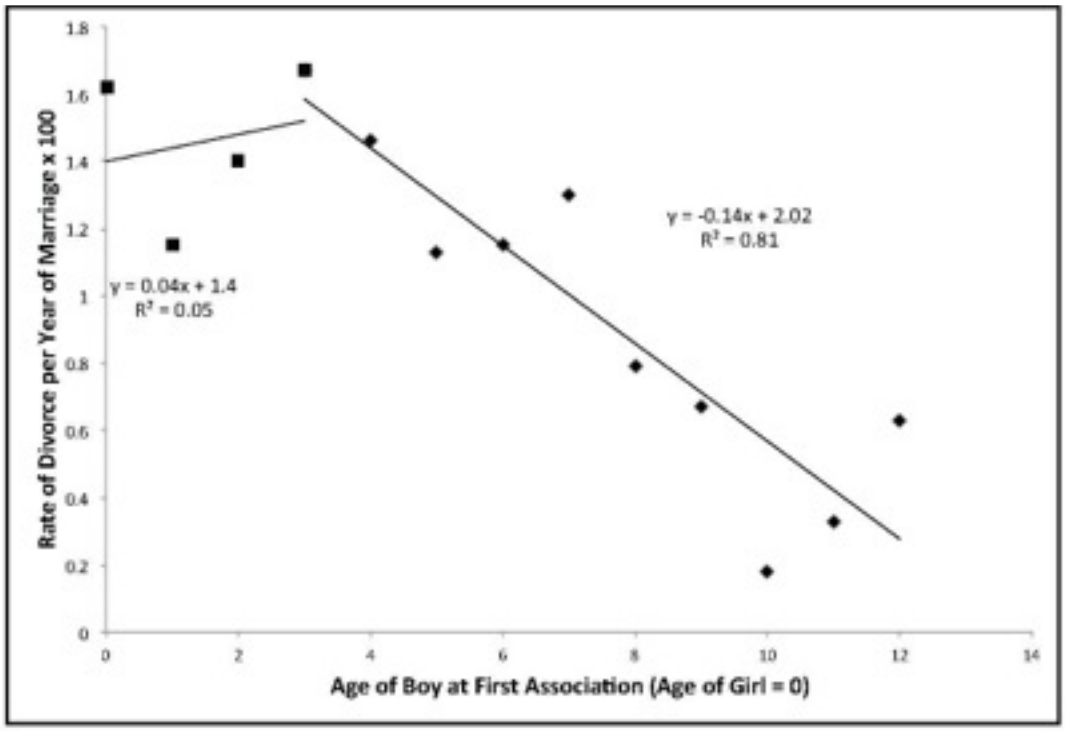

Figure 2: Change in divorce rate in comparison to age of boy at first association with girl of age 0. Slope of regression line for boys from 0 through 3 years of age is not significant ($p > 0.75$, $n = 4$). Slope of regression line for boys 3 through 12 years of age is highly significant ($p < 0.005$, $n = 9$).

does not involve violation of incest taboos and therefore does not generate the psychological stress discussed by Turner and Maryanski that occurs with non-voluntary violation of incest taboos.

(2) Being Raised Together in Israeli *Kibbutzim* Did Not Generate Sexual Aversion

The conclusions reached regarding the *kibbutzim* and assumed sexual aversion have recently been clarified through interviews of adults raised in the *kibbutzim* (Shor & Simchai 2009). These interviews establish that while few of the kibbutzim-raised children married each other, it was not because they experienced sexual aversion. In the interviews of persons raised in kibbutzim until at least 6 years of age, when the Westermarck Effect should already be in place according to its proponents, "many described *strong attraction to peers*" (Shor and Simchai 2009:1833, emphasis added), and the interviewees "did not talk about *sexual aversion*" (Shor and Simchai 2012: 1512). Being raised together may reduce sexual interest (see Walter & Buyske 2010 and references therein), but reduced sexual interest does not provide a causal basis for the universality of incest taboos in human societies.

(3) Lebanese Village Males Were Marrying Sisterlike Cousins

For the Lebanese village marriage data discussed by MCabe (1983), it is not clear whether it is the fact of patrilateral parallel cousins (but not other cousins) growing up together that creates the sexual disinterest suggested by the substantially higher divorce and lower fertility rates for marriages between patrilateral parallel cousins in comparison to other kinds of marriages (see Tables 2, 3, McCabe 1983), or the perception that they are like siblings (see Table 1, McCabe 1983). If the latter, the data may simply be reflecting the effect of the strong taboo on sexual behavior between siblings in Arabic societies in a context where patrilateral parallel cousins perceive themselves to be like siblings. (In general, patrilateral parallel cousin marriages do not lead to problematic marriages in Arabic societies [El Guindi & Read 2012 and references therein]). Anecdotal evidence supports the latter interpretation: "Hilal (1970) also alludes to this sexual apathy of men toward their *sisterlike*, first-cousin wives: 'Men, on the other hand, sometimes show coolness to their marrying a cousin. They say, of a cousin, that '*she is like a sister*'.' [1970:83]" (McCabe 1983:61, emphasis added to both quotes). Regardless, McCabe does not report *aversion* as the sentiment between patrilateral parallel cousins raised together.

Other Data Sets Mentioned by the Authors Do Not Support the Hypothesis of Sexual Aversion

Roman-Egyptian Sibling Marriages Lack Sexual Aversion

Lack of aversion also characterizes other situations where biological sibling marriages have occurred on a regular basis, such as the sibling marriages in Roman Egypt. As discussed in the chapter by Walter Scheidel, there is no evidence that sexual aversion characterized the sibling relationship in these marriages. Scheidel suggests lack of aversion may be due to a large age difference between sibling spouses and so the Westermarck Effect may not be applicable, but his argument only applies, if at all, to the half of the marriages with a large age difference between the sibling spouses. His argument does not apply to the other half of the marriages where the sibling spouses are close in age and so the Westermarck Effect would presumably be active, yet there is no evidence of sexual aversion in these marriages.

Structural Basis for Royal Sibling Marriages

Instances where sibling marriages have been part of royal marriages may have occurred for political reasons, as discussed in the chapter by Hill Gates, hence in situations like this Gates suggests that there may have been strong political pressure to override the supposed aversion to sexual relations between siblings. However, it is also possible that the marriages may have occurred for simpler, structural reasons without hypothesizing sexual aversion. Tongan marriages, for example, required the wife to be of higher rank than the husband, but for the highest ranking royal males, the highest ranking woman would be a sister, hence the brother-sister royal marriages did not require strong political pressure that could override hypothesized sexual aversion, as suggested by Gates.

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Incest in Dysfunctional Families and Incestuous Sexual Relations Between Consenting Adults

While there is evidence from reports of psychological treatment that instances of incest, at least in the West, are associated with dysfunctional families, as discussed in the chapter by Mark Erickson, psychological reports are, by their nature, biased towards the psychologically problematic, as discussed by Turner and Maryanski. In contrast, the internet has provided a way for individuals of similar interests that may be socially repugnant to others to form mutual support groups, and consensual adult incestuous sexual relations are no exception: "there are chatrooms and websites that are de facto support groups for people engaged in incest" (Hart 2002). In addition, a number of countries (including Argentina, Belgium, Côte d'Ivoire, France, India, Netherlands, People's Republic of China, Russia, Spain, and Turkey) have legalized incestuous sexual relations between consenting adults (Wikipedia contributors 2013). The occurrence rate for these consensual relations is not known, but the fact that consensual sibling sexual relations do occur raises questions about the extent to which sexual aversion is the outcome of close co-socialization between siblings of opposite sex, as was assumed by Westermarck.

In sum, whether these data support the hypothesized sexual aversion, let alone a biological basis for the incest taboos through the alleged Westermarck Effect, is still open to question. This is the conclusion reached by Rantala and Marcinkowska (2011, referenced in El Guindi & Read 2012; see also Leavitt 2007) in their extensive review of studies relating to the Westermarck Effect, but is contrary to the assumption made by the authors (with the exception of Durham) associated with the first two books being reviewed here.

Conclusions

The authors associated with the first two books assume a biological basis for kinship that has been dismissed, following the arguments of Schneider (1984), in the recent, constructivist view of kinship, as is discussed by Sahlins. The constructivist approach operates from the assumption that viewing kinship relations through genealogy (with the former assumed to be biologically grounded through procreation) is just part of Western ideology, hence is not universal. However, the matter is more complex than implied by either of these two assumptions.

Regardless of how we might locate kinship along a culture-to-biology dimension, kinship is predicated upon the biological consequences of sexual behavior in the following, limited sense. Contra the constructivist argument, there is no society in which kin terms cannot be given at least a partial definition as a category of genealogical relations identified by applying the kin terms to the individuals in the genealogy of a reference person. Genealogical definitions formed in this manner are often partial since the local ideology for what constitutes being a kin need not be co-extensive with already known genealogical connections -- adoption being an obvious exception since a genealogical relation need not exist prior to the adoption event but may, instead, be established through that event as part of creating a kinship relation through the adoption. However, contra the biological assumption, the connection with procreation is through

culturally, not biologically, understood parent-child relations, as discussed by Sahlins, and this crucial difference underscores the cultural foundations of human kinship systems.

The difference can be seen in how genealogies differ from pedigrees with regard to implementation of the recursive logic upon which both genealogies and pedigrees are based. While genealogies use the same recursive logic as is used to construct a (biological) pedigree for a reference person, a genealogy differs crucially from a pedigree with regard to what the recursion acts upon. A pedigree is recursively traced out using biological mother and biological father connections, whereas a genealogy is traced out recursively through culturally determined mother and father connections; that is, through genealogical mother and genealogical father, for short. The latter depends, for content, on cultural knowledge regarding what constitutes being a mother or a father and this derives from what, culturally, is required to take on the status of motherhood or fatherhood, not from procreation, *per se*. A woman may become a mother through birth in that birth becomes the impetus for her to take on, and be recognized as taking on, the status of motherhood, but that status may arise through other culturally recognized means that need not involve the act of giving birth on her part. Unlike a pedigree that is predicated upon biological mother and biological father links, the genealogy and its structural form obtained through recursive tracing using genealogical mother and genealogical father links is conceptually independent of biology since the logic of recursion can act on whatever may be the cultural instantiation of the genealogical mother and genealogical father relations and does not require their biological instantiation (Read 2001).

Thus, the answer to questions that have arisen with the new reproductive technologies such as: How do we "theorise a genealogical connection between a mother and child conceived using donated ova and born to a surrogate mother" (Edwards 2009: 18, n. 27)? lies in how the question is posed in the first place by being framed with reference to "a mother and child." The genealogical connection only depends on the woman and the infant in question being recognized as mother and child. The lack of biological connection between the woman and the infant is not determinative for the purpose of knowing whether there is a genealogical connection. If she is recognized as the mother of the child, then it follows that there is (from an emic perspective) a genealogical connection between them. From her perspective the infant is "my child" and from the infant's perspective, the woman is "my mother;" that is, they are genealogically connected.

It follows, then, that in discussing genealogical relations, we first need to make it clear whether we mean relations determined through parenthood defined by biological birth (as was assumed by Schneider [Read 2001]), or whether we mean relations determined through indigenous knowledge and ideas about reproduction (as was assumed by Rivers [Bonte 1996:578, referenced in Davinson 2006:18], though not consistently). Sahlins, like Schneider, accepts that genealogy is based on a biological definition of parenthood, yet given his arguments for what kinship is, much of the dispute over the nature of kinship would dissolve simply by recognizing, as argued by Read (2012b), that the evolutionary development from ancestral, non-human primate forms of social systems based on face-to-face interaction to the relation-based kinship systems of human societies organized in the form of kinship idea systems and expressed formally through the logic and structure of kinship terminologies (Leaf & Read 2012) is like a phase transition in a physical system going from a solid to a liquid or a liquid to a gas. A phase transition goes from one form of organization for the system components into another form of

organization for those components. Similarly, the evolution of human societies from precursor, non-human primate societies involved a transition from forms of organization emerging out of face-to-face interaction to forms of organization expressed through the structured system of kinship relations that make up a kinship terminology (Read 2001, 2007; Leaf and Read 2012). This implies for the incest taboos, and contrary to the arguments presented in the first two books under review here, that they are part of indigenous idea systems regarding the structure and organization of the kinship domain and need to be seen through that perspective, rather than through either a constructivist paradigm that assumes structure is derived in real time from practice divorced from biology, or a sociobiological/evolutionary psychology paradigm that assumes cultural phenomena derive directly from practice grounded in biology. Without the latter assumption, the asserted causal role of the presumed Westermarck Effect in the origin of incest taboos evaporates.

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