

ed to adult sexual preference or to other variables that were related to preference were dropped.

The surviving variables were included in path analyses. Variables were ordered according to the sequence outlined above. These analyses are explicitly termed causal ones. The authors assume that significant results illuminate the causes of adult sexual preference.

Most of *Sexual Preference* is devoted to reporting the results of the analyses for white males (*N*: homosexual = 575; heterosexual = 284) and white females (*N*: homosexual = 229; heterosexual = 101). Chapters 3 through 9 report the results for males, and chapters 10 through 16 report them for females. The findings are presented according to the sequence employed in the path analyses.

The presentation is nontechnical; it is primarily descriptive, very clear and concise. There are no data tables. Technical information concerning the analyses, when included, is usually in footnotes. However, bibliographic references are identified only by number; authors' names are never employed. This makes it unnecessarily difficult to assess the adequacy of the literature coverage and the extent to which the findings are consistent with earlier work. The presentation of results separately for men and women produces substantial redundancy in discussion of substantive ideas, prior research, and the current findings.

Chapter 17 summarizes the major findings. Adult sexual preference is the outcome of a complex process; it is found to be related to characteristics of the mother and father, relationships of parents with each other and with the child, degree of conformity to gender role in childhood, and childhood and adolescent sexual arousal or activities. In general, homosexual feelings or arousal in childhood is associated with homosexual arousal or activities in adolescence, which in turn is closely related to adult preference. The authors conclude that the substantial adolescent-adult paths in their analyses indicate that sexual preference is determined prior to adolescence. This leads them to emphasize the importance of preadolescent experiences. An alternative conclusion that is also consistent with their findings is that sexual preference develops gradually throughout the life cycle and that adolescent experiences are relatively more important than childhood experiences.

Sexual feelings are more important influences than sexual behavior on adult preference. Homosexual respondents reported homosexual feelings that preceded

ed by an average of three years involvement in homosexual activities. Further, a major influence on sexual preference is degree of gender-role conformity. Those who as children enjoyed gender-appropriate activities, those who disliked activities appropriate for the other gender, boys who considered themselves "masculine," and girls who rated themselves as "feminine" were much less likely to experience later homosexual feelings and to engage in homosexual behavior.

In general, the authors interpret their results as providing little support for the psychodynamic model, with its emphasis on parent-child relationships and other familial variables.

These general findings are given additional support by analyses of subgroups, for example, of blacks, bisexuals, and various types of homosexuals. These results are reported in chapter 18.

As the authors indicate, this research is far superior methodologically to prior work on homosexuals. The interview schedule was comprehensive, considerable effort was expended in obtaining the homosexual sample, the analyses involve systematic comparisons with heterosexuals, and sophisticated statistical techniques are used to analyze the data. All of these factors enhance the likelihood that the findings are valid. At the same time, acceptance of the authors' conclusions about the causes of sexual preference must be tempered by concern over the retrospective character of the data, the volunteer or convenience character of the homosexual sample, and the arbitrary classification and sequencing of variables in the path analyses.

Relying on path analyses as the major analytic technique is also problematic because the dependent variable is treated as dichotomous rather than continuous. Since the underlying Kinsey scale is a seven-point one, analyses could have been conducted that used the full range of responses. Alternatively, given the intent to systematically compare the homosexual and heterosexual samples, that is, two known groups, multiple classification analysis could have been employed. Its use would not have required a priori decisions about classification and the sequencing of variables.

Most controversial is the suggestion that homosexuality has its origin in biology. In a final chapter, the authors briefly review the evidence that there are hormonal differences between homosexuals and heterosexuals. While acknowledging that the evidence is inconclusive, they state that their results are consistent with the hypothesis that prenatal hormonal factors predispose some persons

to homosexuality. As I noted above, gender nonconformity during childhood is a major influence on the development of homosexual preference. At the same time, the parental, sibling, and other childhood variables included in the analyses did not explain a great deal of the variance in gender nonconformity. Thus, the authors suggest that hormonal factors cause differences in the fundamental organization of the brain or sex hormones or both that in turn lead to nonconforming gender interests and traits and adult sexual preference for members of the same gender.

This is clearly speculative. This research was not designed to test causal hypotheses that include a biological component. No biological characteristics, such as hormone levels, were measured. It is possible that more detailed analyses centered on the gender-nonconformity measure would provide relevant evidence, but such explorations are not reported in these volumes. In this as in other matters, the analyses and presentation of results lack depth. Interesting and at times fundamental questions raised by the results that could have been further explored are not. It is to be hoped that these two volumes do not represent the final exploration of this unique data set.

Anyone who is interested in the childhood and adolescent correlates of sexual preference should read *Sexual Preference*. Persons with a professional interest in the subject should not rely on media accounts for information about the contents of this work. The readers will find a wealth of interesting data and some provocative conclusions.

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Ritual as Politics

The Politics of Reproductive Ritual. KAREN ERICKSEN PAIGE and JEFFERY M. PAIGE, with the assistance of Linda Fuller and Elisabeth Magnus. University of California Press, Berkeley, 1981. xii, 380 pp. \$25.

Reproductive rituals, such as puberty ceremonies for girls, male initiation rites, birth practices in which fathers publicly mimic labor pains, and elaborate menstrual taboos, have long caught the imagination of anthropologists and laypersons alike. Studies of such rituals are numerous and can be loosely divided into "interpretative" studies that focus on what such rituals mean and "explana-

tory" studies that try to explain why reproductive rituals occur in some societies and not in others. The present study falls into the latter category, but, unlike psychoanalytic and social-structural explanations, which treat rituals as unconscious expressions of psychic or social tensions, it treats reproductive rituals as political tactics: rituals are conscious attempts by specific individuals "to persuade others, assess others' intentions, gauge public opinion, and manipulate perceptions" (p. 261). Paige and Paige thus offer not merely another explanation for why reproductive rituals occur in some societies and not others; they offer a different kind of explanation.

Paige and Paige propose a "political theory" of reproductive rituals. They suggest that in preindustrial, stateless societies, events in the human life cycle pose problems for specific individuals who, lacking access to centralized state authority for resolving them, resort to other means, among which are reproductive rituals. In particular, they suggest that, because women and their children represent important political and economic assets for men in such societies, physiological events such as menarche, birth, and menstruation confront men with the problem of asserting, or reasserting, their claims on women. The problems men experience, and their means for handling them, are structured by the power available to them for making and enforcing bargains with other men—power that, according to Paige and Paige, is a function of the size and cohesion of "fraternal interest groups" (corporate units composed of consanguineally related males).

Paige and Paige draw on this line of reasoning to "explain" why reproductive rituals occur in some stateless, preindustrial societies and not in others. They identify four "dilemmas" that female life-cycle events pose for men, and they use fraternal interest group theory to predict how men will handle such dilemmas. The first dilemma is menarche: a girl's sexual maturity (according to Paige and Paige) confronts her father with the problem of protecting her marriage value (that is, her virginity). Paige and Paige predict an association between girls' puberty ceremonies and weak fraternal interest groups on the grounds that in societies without strong fraternal interest groups to either protect a daughter's virginity or make her lover pay up fathers sponsor puberty rituals to assess, and demonstrate, the amount of political support they can expect from other men in negotiating a daughter's marriage. The second dilemma is "fission": in societies

where leaders rely on having many junior kinsmen to protect their rights, the birth of sons to junior kinsmen confronts leaders with the problem of preventing juniors from diverting their loyalties from seniors. Paige and Paige predict a correlation between male circumcision and strong fraternal interest groups on the grounds that political leaders in such societies stage circumcision ceremonies in order to make adult men prove their loyalty to elders by risking their most valuable political asset: a son's penis. The third dilemma is "legitimacy": because paternity is socially rather than biologically defined, the birth of a child confronts those men who might claim fatherhood with the problem of establishing paternity. Paige and Paige predict a positive correlation between restrictions on a pregnant woman's activities and strong fraternal interest groups and a negative correlation between such groups and birth practices requiring ritual involvement by a mother's husband (couvade), on the grounds that in societies with strong fraternal interest groups the availability of enforcement power allows husbands to demand compensation from wife's kin if a wife "fails to produce healthy offspring of unambiguous paternity" (p. 183), thus giving both families a reason for monitoring the activities of a pregnant woman, whereas in societies lacking strong fraternal interest groups a father must establish paternity claims himself. The last dilemma is "a wife's continuing fertility," which is closely related to the dilemma of fission: because menstruation offers proof of a woman's continuing ability to conceive, a menstruating wife confronts her husband with the problem of how to represent to other men his power to build his own descent group. Paige and Paige predict a correlation between "unstable political power" (big-man political systems) and "segregation practices" (seclusion of menstruating women or of adult men) on the grounds that in societies with unstable power men represent their power through elaborate displays of ritual disinterest in both goods and wives.

Paige and Paige test their predictions using the cross-cultural method. They selected a sample of 108 tribal and band societies from the Standard Cross-Cultural Sample developed by Murdock and White. They hired assistants to code ethnographies of those societies for the presence or absence of reproductive rituals and for traits indicating the size and cohesion of fraternal interest groups. Finally, they calculate the correlations between dependent (ritual) variables and

independent (fraternal interest group) ones. The correlations obtained are impressive, and for some predictions Paige and Paige obtain more impressive correlations than rival theorists by recalculating those theorists' correlations using "updated" codes or "improved" sampling procedures.

Although Paige and Paige offer a different kind of explanation for the occurrence of reproductive rituals from those of previous theorists, they do not explore either the methodological or the theoretical implications of their assumption that "reproductive rituals are motivated by self-interest" (p. 50). They correctly criticize psychoanalytic and social-structural explanations for assuming that the purposes of rituals are seldom, if ever, the object of conscious knowledge, but they make no attempt to use the method their "political theory" makes possible: they do not try to discover the motives that people in societies having reproductive rituals attribute to those who sponsor the rituals. Rather they simply attribute to ritual sponsors the motives they think sponsors should have, and they test their explanations using the same—if improved and updated—cross-cultural method as previous theorists. Like previous theorists, Paige and Paige simply calculate the correlations between ritual and socioeconomic variables, and so, like previous theorists, they never examine directly their proposed link between antecedent socioeconomic conditions and consequent rituals.

Similarly, though criticizing previous theorists for ignoring the motives of those who actually spend time and resources sponsoring rituals, Paige and Paige do not use this insight to question the theoretical adequacy of explanations that treat the consequences of rituals, where these are unknown or unintended by ritual sponsors, as reasons why such rituals occur. Rather, they criticize previous theorists primarily for failing to obtain as high correlations between variables as they did.

Because Paige and Paige fail to explore the methodological and theoretical implications of their "political theory" they in fact end up attributing to ritual sponsors motives those sponsors would find incomprehensible. The motives they attribute to ritual sponsors are culturally appropriate primarily for people in those preindustrial, stateless societies in which private property (the right of an owner to deny nonowners access to productive resources) is recognized but which lack police forces and armies to protect property owners from the propertyless. In other words, the motives are appropriate

for pastoralists who live on the edges of complex agrarian states but quite inappropriate for people in most of the 108 tribal and band societies Paige and Paige use for testing their theory. People who lack the concept of private property seldom worry about the virginity of brides or the unambiguous biological paternity of offspring, and not all men have as great a need for collecting loyal kinsmen as do property owners whose ability to enjoy a privileged life-style depends on having many kinsmen to protect their herds.

A further difficulty is that Paige and Paige posit motives only for men, although several of the rituals they analyze, such as girls' puberty ceremonies, are often put on by women. In all societies, the motives people attribute to women are related to the motives they attribute to men, but seldom are they identical.

In summary, the "political theory" of reproductive rituals presented by Paige and Paige rests on three insights that elevate their book above previous explanatory, cross-cultural studies: that ritual is a form of politics, that rituals can be explained only in terms of motives held by sponsors, not in terms of benefits accruing to such nonsponsors as youthful initiates, and that rituals are motivated by self-interest. Though Paige and Paige fail to take full advantage of their insights, their failures offer opportunities for future researchers.

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Imaging from Space

X-Ray Astronomy with the Einstein Satellite. Proceedings of a meeting, Cambridge, Mass., Jan. 1980. RICCARDO GIACCONI, Ed. Reidel, Boston, 1981 (distributor, Kluwer Boston, Hingham, Mass.). viii, 330 pp., illus. \$44.50. Astrophysics and Space Science Library, vol. 87.

The successful launch of the Einstein Observatory in November 1978 put high-resolution x-ray imaging instrumentation into orbit for the first time and thus represented an enormous stride forward for x-ray astronomy. The detectors on board Einstein provided the first optical-quality images of celestial x-ray sources and, as a result of their imaging capability, were a thousand times more sensitive to point sources than anything flown previously. (This, it has been noted, is analogous to proceeding from a 6-inch

telescope to the 200-inch on Mount Palomar in a single step.)

This volume consists of the proceedings of a meeting of the High Energy Astrophysics Division of the American Astronomical Society devoted to the presentation and interpretation of the results of the first year of observations by the satellite. An impressive range of topics is addressed: nondegenerate stars, supernova remnants, normal galaxies, clusters of galaxies, and quasars, among others. Such breadth seems particularly significant when one considers that as recently as a few years ago x-ray astronomy was regarded by traditional astronomers (not completely unfairly) as a rather isolated subfield with a particularly narrow range of interest—the accreting degenerate stars in binary systems.

Because of the tremendous explosion of data that Einstein provided and the relatively short time that astronomers have had to analyze it, much of the material here is necessarily presented in somewhat undigested form. This is not a major drawback, however, and most of the contributors do a creditable job in outlining the initial results and their possible implications for existing and, perhaps, future theories.

The paper that is probably the highlight of the proceedings is uncharacteristic in that it represents more of a closing of a particular chapter in x-ray astronomy than an opening. It had been suggested in the mid-'70's on the basis of some rather indirect arguments that the x-ray sources in globular clusters might be black holes of a thousand solar masses. In "X-ray sources in globular clusters," J. E. Grindlay describes his observations of eight such clusters with Einstein, in which the precise positions of the x-ray sources were measured with respect to the optical centers of the clusters. By considering these sources as "test particles" in the cluster potential wells, one could then determine their masses in a statistical sense. Grindlay found a probable mass of $2 M_{\odot}$, which is consistent with the masses of the familiar x-ray binaries and rules out heavier, more exotic objects. (One can rest assured, however, that the $1000 M_{\odot}$ black hole will not soon pass into obscurity; its existence—in a new context—is predicted even before the end of the volume.)

The book provides a valuable background against which the new literature in x-ray astronomy can be read; it should not be taken (nor is it intended) as a source of journal-type articles or reviews. One drawback to the collection is that a few of the contributors, faced with such a wealth of data, somewhat para-

doxically overinterpret them. For example, it seems unlikely that the x-ray data on quasars really constrain the numbers of optically faint quasars as severely as is suggested here, and the issue has in fact been much debated since the meeting. Occasional excesses of this sort might have been tempered by including in the volume a few of the often probing questions that followed each paper at the conference.

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Massive Sulfide Orebodies

The Buchans Orebodies. Fifty Years of Geology and Mining. E. A. SWANSON, D. F. STRONG, and J. G. THURLOW, Eds. Geological Association of Canada, Toronto, 1981. x, 350 pp., illus., + loose maps in slipcase. \$36. The Geological Association of Canada Special Paper 22.

The Buchans district, in the Central Volcanic Belt of Newfoundland, has truly exceptional orebodies of the volcanic-associated massive sulfide type, with 17.5 million tons of ore that yielded, from 1928 until the present, much more total zinc, lead, and copper than the 94 million tons of ore in the Noranda district of Quebec. The Buchans deposits are of late Ordovician age and are slightly deformed and metamorphosed and thus are ideal for intensive study of primary depositional characteristics.

The volume contains, in addition to a broad selection of papers on specific aspects of the deposits, two papers (Neary and Swanson) reviewing the history of exploration, discovery, development, mining, and research at Buchans. Although these papers are atypical for a technical review volume, they provide an excellent perspective for the research efforts presented in the remaining 13 technical papers. Throughout the history of Buchans, exploration was guided by geological deduction and not by the geophysical data more typically used in most Canadian massive sulfide camps.

Discussions of the geology of the Central Volcanic Belt (Kean, Dean, and Strong) and of the Buchans district (Thurlow) are accompanied by excellent loose colored maps. The Buchans Group is a late arc sequence, formed about 450 million years ago, according to Bell and Blenkinsop's interpretation of rubidium-strontium data.

Thurlow and Swanson, in an excellent description of the Buchans deposits, em-