Natural Intentions: Fertility Decline in the African Demographic and Health Surveys[1]

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Many recent models of society treat certain forms of action as revealing individual intentions, aspirations, or preferences. For example, formal models of fertility decline following Henry and Coale take specific childbearing distributions to indicate "natural fertility," where couples take no intentional action to manage their reproduction. This article argues that this mode of inference can be valid only when the cultural repertoires that mediate between intentions and actions are well established. Using data from 18 African countries, the author compares women's self-reported intentions to those attributed to them under standard demographic models and finds significant discrepancies. The link between intentions and outcomes is itself a social product.

> Without adequacy on the level of meaning, our generalizations remain mere statements of statistical probability, either not intelligible at all or only imperfectly intelligible. . . . On the other hand, even the most certain adequacy on the level of meaning signifies an acceptable causal proposition only to the extent . . . that the action in question really takes the course held to be meaningfully adequate with a certain calculable frequency.—Max Weber, 1978

At least since Weber, sociologists have struggled over the relationship between statistical patterns and systems of social meaning. Some have sought to integrate qualitative and quantitative methods; others have

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worked at a theoretical level on the incommensurability of statistical and semiotic ways of knowing. Still others have sought to dispense altogether with either "calculable frequencies" or "adequacy on the level of meaning," reducing the sociological enterprise to ethnology or regression analysis. Yet, both statistics and meaning are essential to an understanding of social life, and when banished, they sometimes creep in through the back door. This article argues for a critical engagement between statistical and semiotic approaches by demonstrating how statistical approaches can go awry when they take meaning for granted.[2]

Indeed, statistical approaches in sociology quite often take meaning for granted, assuming stable relationships between population outcomes and individual aspirations or intentions. Rational choice theory, in which "fixed preferences" are "revealed" by behavior, is perhaps the most explicit and comprehensive example, although not the only one. Rational choice and related approaches offer two ways of dealing with the problematic relationship between meanings and rates. They first suggest a method for predicting aggregate behavior from known individual preferences, intentions, or projects. If we know that the "average man" (Quetelet [1869] 1997) wants to marry young or buy a sports utility vehicle, we predict numerous early marriages and high SUV sales. Second, and central to the present article, rational choice and related approaches propose a method of inferring preferences, intentions, or projects from aggregate behavior. If many SUVs are sold, we infer that the "average man" desires one.

This mode of inference rests on a semiotic relation in which some set of formal outcomes stands for some set of socially meaningful intentions or practices. Sometimes the relation between sign and object appears transparent (such as self-reported age at first sex standing for age at first sex), whereas in other cases, complex chains of inference are required in order to grasp it (concave age patterns of marital fertility standing for widespread intentions to limit child numbers). Like all symbolic relations, the ones that bind formal models to social facts are valid only within a universe of practices; when the framing social context changes, the standing-for relations change along with it (see Benveniste 1985). Thus, a formal pattern that in one society indexes some intention may in another society index a quite different intention, or even none at all.

I am not alone in my concern that we too easily imbue statistical regularities with social meanings. In his compelling argument for the importance of ambivalence in social action, Smelser (1998) examines several ways in which social statistics may distort public sentiment. He argues

[2] I do not intend to imply that meaning-based approaches that ignore statistical regularity are any safer, and have argued elsewhere for the importance of statistical methods in ethnography (Johnson-Hanks 2002*a*, 2004, 2006).

that "we must regard attitude surveys not as revealing preferences but as a distorted structure of reality that minimizes, and—in the process—delegitimizes both ambiguity and ambivalence" (Smelser 1998, p. 11). This is perhaps even truer for research that treats aggregate *behavior* as revealing preferences. Just as people are constrained to answer yes or no on a survey, they are constrained either to buy the SUV or not to buy it, either to marry young or not to do so. Inferring intentions from outcomes erases not only the actor's ambivalence about the course of action, but also the very real uncertainty that existed prior to the action. When the data refer to individual actions in a familiar society, these inferences are a kind of "backshadowing," as critiqued by Bernstein (1994). But when the data are population rates in less familiar societies, the epistemological status of inferred intentions is more fragile yet. The inference of individual intentions from population statistics relies on an analogy to semiotics, whereby the statistics serve as indices of the intentions.

An index is a sign that implies some other event or object; that is, in contrast to icons and symbols, an index stands for something by contiguity (Saussure 1966). The doorbell indexes that a guest has arrived. The smoke indexes that the fire has been lit. Convex age-specific marital fertility rates index natural fertility. And so on. However, in the case of social science inferences of intentions from statistical patterns, this "natural" association is mediated by a plethora of social facts: the relationship between signifier and signified becomes conventionalized, and the would-be indices work more like symbols. Unlike the smoke's fire, the meaning of convex age-specific marital fertility rates depends on conventional social practice, and is therefore constructed differently in different societies. As Swidler (1986, p. 284) has argued, "Culture has enduring effects on those who hold it . . . by providing the characteristic repertoire from which they build lines of action." In interpreting social statistics, we are reading the detritus of these lines of action, like archeologists reconstructing the intentions of past peoples from the trash they left behind.

Swidler's model of culture as providing a set of tools (rather than determining ultimate values) is useful for thinking about how we can and cannot "read" social statistics, because the repertoire of practicable alternatives establishes the mapping from intentions to actions. Reasoning backward from outcomes to intentions, we must therefore assume a stable cultural repertoire of alternatives, a shared set of schemata through which resources and action are made legible. As Sewell (1992, pp. 20–21) argues, "What kinds of desires people can have, what intentions they can form, and what sorts of creative transpositions they can carry out vary dramatically from one social world to another depending on the nature of the particular structures that inform those social worlds." Formal models that treat action as "revealed preference" make unreasonably strong as-

sumptions about the kinds of preferences that people might have and the ways in which preferences can motivate action.

In this article, I make this theoretical argument through a close analysis of one classic example of such inferential thinking, that of natural fertility. The sociology of fertility has relied heavily on rational choice approaches, using "a conceptual model in which fertility-related behavior is seen as determined by a long-range planning process, modified by unanticipated life course contingencies" (Schoen, Astone, Nathanson et al. 2000; see also Bulatao 2001; Caldwell 1982; Knodel 1979; Pritchett 1994; Quesnel-Vallee and Morgan 2004; Yamaguchi and Ferguson 1995). Using data from historical Europe and North America, scholars have assumed that this "long-range planning process" must take one of a limited set of forms, linking a formally defined pattern of fertility with the explicit intention to limit family size. This linkage has acquired the status of a presumed universal. This article uses Demographic and Health Survey data from 18 sub-Saharan African countries to demonstrate that the linkage is not universal: in fact, it does not hold in any of the countries in this analysis.[3] Quantitative models of meaningful social behavior are always historically particular: semiotics cannot be assumed in statistical analysis.

Demographic theories of fertility decline offer a key example of the inference of intentions from population rates. Consonant with rational choice theory, most available models of reproductive change assume that "fertility decline is a largely rational process" driven by "the desire for smaller families" (Bulatao 2001, p. 11); that is, individual intentions about child numbers—*Sinnzusammenhängen* that motivate action—drive the transformation from one demographic regime to another. However, relatively few studies of fertility change really examine those desires for smaller families, or any of the other systems of meaning that should—according to the theory—lie behind falling birth rates. Instead, the indexical tie is assumed. A significant corpus of work infers intentions from population-level fertility patterns, treating the structures of rates as indices of the meanings. This mode of inference follows from the work of Henry (1953, 1961) and Coale and Trussell (1974; see also Coale 1973). Henry identified age-specific patterns of marital fertility and parity-specific patterns of birth intervals that he argued indicated natural fertility, or the absence of purposeful limitation of childbearing. Coale and Trussell de-

[3] To be clear, I am not arguing that African women act irrationally or without aforethought. Although I do think that there are reasons to question the importance of means-ends rationality and utility maximization, even in the rich West, that is not my project here (but see Johnson-Hanks [2005] for a discussion of the limits of rational choice in accounts of reproduction behavior).

veloped ingenious methods of inferring intentional fertility control from birth records, the now widely (and rightly) used Princeton Indices.

Both Henry and Coale and Trussell sought to make inferences about couples' reproductive intentions from data about births. For work on historical fertility transition, such inference was necessary because the theoretical models of reproductive change focus on knowledge, choice, and intentional action (e.g., Coale 1973; Davis 1963; van de Walle 1992), about which we know unfortunately little for most populations in the past. By contrast, the Demographic and Health Surveys (DHS) conducted throughout the developing world over the past two decades ask direct questions about reproductive intentions, as well as about births. This article takes advantage of those data, comparing the inferences about couples' intentions made on the basis of their reproductive patterns with women's own assertions of their intentions, and finds that these two approaches yield contradictory results. The classic models lead to the wrong interpretations of African data because the social organization and "characteristic cultural repertoires" of African fertility are fundamentally different than those of the historical European populations on which the standard demographic models are based. There are a variety of modes of reproductive management, of which parity-specific control within marriage is only one. African women who do not desire to limit the number of children they bear nonetheless exert considerable conscious effort in organizing and administering their reproductive careers, and this organization has demographic consequences.

The argument proceeds as follows. I will first lay out the concept of natural fertility and how it has been formalized, focusing on the influential work of Louis Henry (1953, 1961), Coale and Trussell (1974; Coale 1973, 1986), John Knodel (1977, 1979), and Anderton and Bean (1985). The key here is that natural fertility links specific demographic patterns with individual intentions, allowing demographers to infer what people want from what populations do. In the next section, I describe how we can use a high-quality and widely available data set, the DHS, to evaluate how well inferences from the model correspond to women's own accounts of what they want. The subsequent section applies two different formal tests to the DHS and finds no correspondence between the self-report and the inferences from the model in any of the 18 sub-Saharan countries. This suggests that the cultural repertoires through which African women organize their action differ so much from those built into the quantitative models that the models misattribute their intentions. The final section of the article offers an analysis and interpretation of these results, drawing both on recent work on reproductive intentions and on my own fieldwork in Cameroon and Burkina Faso.

The empirical case of reproductive change in Africa has significant

theoretical implications regarding intentional action and the inference of Weberian meanings from statistical regularities. I argue that this mode of inference is only valid when it is unnecessary. That is, in order to say with certainty that in a particular social context a set of population rates indexes a set of meanings, it is necessary have compelling, independent data regarding those meanings. Almost a century later, Weber's admonition against sociological arguments without both adequacy of meaning and statistical regularity still stands.

THE CONCEPT OF NATURAL FERTILITY

The decline of fertility worldwide, beginning in France in the 18th century and continuing to the present, represents one of the most monumental changes in human experience in history. In 1800, a typical European women could spend 18 years either pregnant or breast-feeding one of her six children. Today, most women in rich countries will have two children or fewer. Hypotheses about the underlying causes of fertility decline, notoriously diverse and divisive, are often classified into microeconomic and diffusion theories.[4] Despite their differences, however, both perspectives model declining reproductive rates as the result of changing fertility *intentions*, allowing for some variance due to contraceptive availability, pathological sterility, and other mitigating factors. This tradition has its intellectual origin in Coale's pioneering work on the demographic transition, in which he argues that fertility decline can only occur once total child numbers enter the "calculus of conscious choice" (1973). That is, fertility decline is treated as largely equivalent to the emergence of parity-specific fertility control, or the limitation of marital fertility once a specific target number of children has been attained. Insofar as fertility decline is subsumed into parity-specific control and parental rationality, the debate about the causes of fertility decline becomes a debate about the causes of changing reproductive intentions. Knodel (1983, table 1) identifies "deliberate stopping" with the "intent to limit family size" as the sine qua non of controlled fertility. That is, fertility falls because couples think about their fertility and choose to limit the number of children that they bear.

Intentional action thus plays a central role in theories of fertility change. Definitions of natural fertility focus almost exclusively on what parents

[4] See Alter (1992), Bulatao and Lee (1983), Hirschman (1994), and Mason (1997) for overviews. Examples of the microeconomic perspective include Becker (1991), Easterlin and Crimmins (1985), and Pritchett (1994). Examples of the diffusion perspective include Bongaarts and Watkins (1996), Cleland and Wilson (1987), Montgomery and Casterline (1996), and Watkins (1990).

aspire to and try for, or—perhaps more accurately—on whether they hold any reproductive aspirations and intentions at all. Thus in an early formulation, Henry (1953) writes that natural fertility is "the fertility that a given human population would have if it made *no conscious effort to limit* births." If natural fertility means that populations make "no conscious effort to limit births," then only data about intentional reproductive action could conclusively confirm that they conform to natural fertility.[5] That is, this definition commits us to modes of data collection and data analysis more common to social psychology and cultural anthropology than to demography. In a later restatement of the theory of natural fertility, Henry loosened this requirement somewhat. Defining natural fertility as marital fertility in the absence of parity-specific control, he writes that "Control is said to exist when the behavior of the couple is bound to the number of children already born and is modified when this number reaches the maximum which the couple does not want to exceed" (Henry 1961, p. 91). Although this model of natural and controlled fertility still rests on what the couple *wants*, it is now largely perceptible in modified *behavior*. At the limit, data on the couple's reproductive conduct at each parity is sufficient to demonstrate whether they practice natural or controlled fertility under this definition. Envision a couple that practices no contraception, limitation of coital frequency, or strategic use of breastfeeding until their sixth child is born, when the woman is sterilized.[6] Even without direct data about the maximum number of children that the couple did not want to exceed, these behaviors through time seem to be convincing evidence that the couple conforms to this definition of fertility control. At the same time, this model shifts natural and controlled fertility away from being characteristics of *populations* toward being characteristics of *couples*, allowing a single population to include both natural and controlled fertility couples, some altering their reproductive behavior after

[5] Note that Henry writes that the *population*, rather than the couple or individual, makes no conscious effort to limit births. In reference to this, see Weber (1978, chap. 1) for a discussion of theories of collective action and Searle (1983), who argues that intentionality (mental states that are about something, of which intention is one example) is necessarily individual.

[6] Of course, this kind of reproductive regime characterizes relatively few couples, whether because fertility targets change over time (Lee 1977), because couples are uncertain about their reproductive intentions (Morgan 1982), or because reproductive intentions are bound to qualities of children (sex composition, timing, health) rather than their number (Picard-Tortorici 2000).

a certain parity, others not.[7] For this reason, only individual-level, diachronic data about reproductive action would be sufficient to reliably demonstrate natural or controlled fertility under this definition. Synchronic data about the reproductive behavior of couples at different parities could stand in for information about couples over time, but cannot provide direct evidence of "fertility control" under this formal definition.

A third conceptual approach is to equate natural fertility with fertility in absence of conscious control, particularly through contraception and abortion, regardless of whether these are employed in a parity-specific manner (see Coale 1986, p. 9; Livi-Bacci 1986, n. 4). For example, Willigan and his coauthors use Bongaarts's proximate determinants model to argue that certain 19th-century U.S. populations must have practiced controlled fertility, because their fertility was lower than what would have been predicted using the proximate determinants in the absence of contraception and abortion. They thus define a natural fertility population as "one in which married couples practice neither contraception nor induced abortion" (Willigan et al. 1982, p. 174). The advantage of this perspective is largely practical; data about the intentional states of individuals, the hopes of couples, or even their parity-specific actions are rarely available, whereas data about approximate contraceptive prevalence are more easily obtained. However, this approach to natural fertility is the weakest conceptually. If taken literally, it means that any contraceptive use disqualifies a society from natural fertility and invites the assumption that people in natural fertility populations have children "n'importe comment" ("howsoever"), or "en desordre" ("in disorder"), as my Cameroonian informants liked to say. To my reading, the empirical literature suggests that such a position in untenable. A series of papers (Bledsoe, Banja, and Hill 1998; Johnson-Hanks 2002*b*; Santow 1995; Ware 1976) have now demonstrated that the absence of parity-specific control is frequently conjoined with contraceptive use. That is, in some contexts, natural fertility is *achieved*. Following on the work of John Caldwell and Pat Caldwell (especially Caldwell and Caldwell 1987; Caldwell, Oruboloye, and Caldwell 1992), it is clear that a substantial proportion of contraceptive use has spacing or short-term delay as its goal. Developing this line of research, I argue that the fundamental split is not between societies that manage reproduction and those that do not, but between those for which child numbers

[7] The shift in Henry's conceptualization of natural fertility from the population to the couple has a striking parallel in theories of fertility decline that focus centrally on the individualization of decision making. For example, Knodel writes that with the change to controlled fertility, "the predominant mechanisms for fertility control moved from the societal level to the family level . . . and it is precisely this shift that can be considered the core of the modernization of reproductive behavior" (Knodel 1979, p. 501; see also Lesthaeghe 1983).

becomes the single object of reproductive management and those for which other aims are as—or more—important than child numbers per se.

MEASURING NATURAL FERTILITY

If the distinction between natural and controlled fertility is, following Henry, fundamentally about whether there is a "conscious effort" to limit births within marriage, then evidence about consciousness should be central to analyses of the transition. However, such data almost never exist for populations in the past. In order to analyze the transition from high to low fertility in European and European-descended populations, scholars have had to find indirect ways of inferring whether married couples were intentionally limiting their childbearing. Because intentional limitation has been considered synonymous with parity-specific control, some scholars have looked for population-level patterns of births that would indicate parity-specific stopping. This work has drawn attention to the age-specific pattern of marital fertility (Coale and Trussell 1974; Knodel 1977; Wilson 1984) and the parity distribution of cohorts with completed fertility (David and Sanderson 1988; Okun, Trussell, and Vaughan 1996). Other scholars have been less committed to parity-specific control, sometimes considering spacing or marriage postponement as forms of intentional fertility limitation (Feng, Lee, and Campbell 1995; Hionidou 1998; Szreter and Garrett 2000). In this light, research on the parity-specific pattern of birth spacing has been particularly vibrant (Anderton and Bean 1985; Mineau, Bean, and Skolnick 1979).

The Coale-Trussell model ("M & m") rests on the insight that any age-specific marital fertility pattern can be described with two parameters: one for the underlying level of natural fertility (M) and the other for the degree of difference between the observed rates and a natural fertility pattern (m). These two parameters are sufficient, Coale and Trussell propose, because the age pattern of natural fertility is primarily physiological (and therefore unchanging across populations), and populations in which fertility is controlled will have systematically larger discrepancies from natural fertility at higher ages. In this model, higher values of m indicate greater diversion from a natural fertility pattern, which in turn indicates the intentional limitation of births. That is, the Coale-Trussell model establishes an indexical relationship between a pattern of birth rates and a set of intentional states, in just the same way as does standard rational choice.[8]

[8] Coale writes: "Control is indicated, crudely, by a steeply declining age-schedule of

The parity-specific birth interval method, employed by Anderton and Bean, approaches the problem of identifying a set of intentional states out of demographic data from another angle. Since fecundability and coital frequency decline (on average) with age, and rates of miscarriage and stillbirth increase, the intervals between births in a natural fertility population should increase with parity. When populations of women with completed fertility are classified by highest achieved parity, each subpopulation should show an upward trend of birth intervals with parity, but the slopes will differ: steep for low parities and nearly flat for subpopulations with 10 or more children. The first interval—that between marriage and the first birth—has a special status, which becomes a substantial problem in relation to the African data, as we will see. Unlike subsequent intervals, the first one can be negative, or very short. Also, while every woman with two children has a second birth interval, only married mothers have a first one. Despite these problems, first-birth intervals are extremely important: undisturbed by breast-feeding and postpartum abstinence, among never-contracepting women they should vary only with coital frequency, fecundability, and spontaneous intrauterine mortality.

It is perhaps obvious, but nonetheless important, that both of these methods apply to *marital* fertility. Decreases in total fertility due to a decline in the proportion of women married are thus not considered evidence of fertility transition. This exclusion makes sense in a model where fertility transition is seen as the object of explicit, intentional action to reduce the number of births, rather than as a more general set of processes by which, for example, the net reproduction ratio declines. It is also important to make some mention of social organization of marriage and childbearing in the societies that came to define natural fertility. In Europe, men married when they had access to land; marriage was relatively late for both men and women, strictly monogamous, and far from universal (see Dupâquier et al. 1981; Hajnal 1965, 1983). Among the Mormons and Hutterites of North America, marriage was both earlier and more common. For all of these societies, however, nonmarital childbearing, polygyny, and extended spousal separation were all undesirable. Breast-feeding was limited, and sexual abstinence within marriage was rare. Why should these societies define (universal) natural fertility? Simply because they were the societies for which we had reliable data prior to large-scale fertility decline. There is no particular reason to compare contemporary Africans to 19th-century Mormons, Europeans, or Hutterites, except that

marital fertility, and more precisely by such clues as a substantially earlier age at the birth of the last child for women who married under age 25 than for those who married over 30" (Coale 1973, p. 59). Because the DHS includes relatively few women who have completed their childbearing, this second comparison cannot easily be made using DHS data.

these latter groups are treated in the standard models as the universal norm against which reproductive rates are compared.

DATA AND METHODS

Both the Coale-Trussell model and the birth-interval method of Anderton and Bean were developed to infer something about reproductive intentions and actions from demographic data on births, either because direct data on intentions was of questionable validity, or—more important—because such data were simply nonexistent. Since the 1960s, however, we have had increasing quantities of individual-level survey data regarding reproductive intentions and practices from women living under conditions that could be described as natural fertility. The most important of these surveys are the DHS, funded by USAID and conducted by Macro International in conjunction with national statistical agencies. The DHS questionnaires are based both on the World Fertility Surveys that preceded them and on a set of family and fertility surveys done in the United States, most notably the Growth of American Families Survey (1955 and 1960) and the National Fertility Surveys (1965, 1970, and 1975). Questions such as "Do you want a[nother] child soon, later, or not at all?" and "Do you intend to use contraception?" have generated dozens if not hundreds of papers on the correlates of given reproductive intentions. Thus, we are no longer obliged to make inferences about contraceptive practice or reproductive intentions from the age and time patterns of actual births, but can instead contrast the understandings gained from those patterns to the information from self-reported contraceptive use and fertility intentions.

This article relies on data from the DHS for 18 sub-Saharan African countries: Benin (2001), Burkina Faso (1998/99), Cameroon (1998), Central African Republic (1994/95), Chad (1996/97), Côte d'Ivoire, (1998/99), Ethiopia (2000), Ghana (1998), Kenya (1999), Madagascar (1997), Malawi (2000), Mozambique (1997), Niger (1998), Nigeria (1999), Senegal (1999), Tanzania (1999), Zambia (1996), and Zimbabwe (1999). These countries represent a wide range of economic, political, and social situations, and all regions of the subcontinent. The DHS are nationally representative samples of women ages 15–49. Sample sizes vary from 5,501 for Cameroon to 15,367 for Ethiopia. The data used here all come from the women's individual recode files, particularly the birth registers. While the first round of DHS surveys showed some date displacement in the birth registers, analysis of the data quality in the more recent surveys indicates that errors are minimal (DHS 1996). Following standard practice, I use the sample weights in calculating rates.

Because the birth registers are coded from most recent backward to

the first birth, it was necessary to recode data on the duration of the birth intervals into new variables by parity. In other words, I generated variables that indicate the duration of the second interval, third interval, and so forth, regardless of where the associated births occur in the birth register. In addition, I constructed age-specific marital fertility rates for women's entire reproductive lives by coding married person years lived in each age range and marital births in each age range. Using these data to calculate rates allows the analysis of cohort, rather than only period, fertility rates. With these exceptions, the analysis is transparent and uses standard methods, corresponding to the techniques described above. Throughout the article, the analysis is limited to ever-married and, in many cases, to currently married women; all other exclusions are explained as they become relevant.

The DHS contains several questions that can be used as proxies of the "deliberate stopping" with the "intent to limit family size" that identify controlled fertility in Knodel's (1983) classification, and more broadly in the Henry-Coale-Trussell paradigm. I rely on the simplest alternative. Limiting my sample to women ages 40–44 at the time of interview, I consider those who say that they still want more children as having natural fertility.[9] Women who do not want any more, and who have already used contraception, are classified as having controlled fertility. This formalization has several advantages. First, it comes closest to approximating the mental states that the Princeton Indices are intended to infer: women who want to have more children have clearly not deliberately stopped bearing children. Second, it permits the analysis of cohort, rather than period data. This is not only more appropriate given the theoretical framework, but corresponds more closely to the historical analyses of Europe that I use as comparisons. Finally, this classification drops very few women, keeping the sample sizes large and the results reliable. Other formalizations are of course possible, and the choice of formalization does not significantly alter the main results.[10]

[9] I use the age group 40–44 rather than the highest age group (45–49), to reduce the selection problem. Relatively few women in the oldest age group still want additional children, and they are highly selected for subfecundity or long-term marital separation. In fact, running the same analyses on the older women produces the same pattern, but yet stronger results. I have chosen to present the more conservative, and therefore less controversial, data. Warm thanks to James Trussell for suggesting this formalization.

[10] I have conducted this analysis using two alternative measures of natural fertility, using period rather than cohort measures, and country-by-country as well as aggregated by region, and the basic findings are always the same. The alternatives that I have tried define natural fertility as (1) women who want 10 or more children, or who say that the number is up to God and have never used contraception; and (2) women who say that the number of children is up to God and currently want more children.

AGE-SPECIFIC MARITAL FERTILITY IN AFRICA

The Coale-Trussell model identifies the degree of conscious fertility limitation by examining the degree to which observed age-specific marital fertility rates diverge in shape from a standard pattern, which was established empirically from data from a collection of known natural fertility populations. This section of the article applies the Coale-Trussell model to the African data, dividing married women ages 40–44 who say that they still want to bear additional children, from women in the same ages who say that they want no more and have used contraception (presumably to achieve that intention). This analysis shows that in all 18 African countries, these two groups of women have nearly identical age-specific marital fertility rates indexed to marital fertility 20–24.[11] That is, even when the subpopulations are defined by the parameter that the measures are intended to detect, the measures do not detect them in contemporary African data.

We will see that the Coale-Trussell indexed marital age-specific fertility rates for the cohort are nearly identical for women who are controlling their fertility as for women who are not. The raw data, however, do differ significantly, albeit not in the direction suggested by the model. Figures 1, 2, and 3 show marital age-specific fertility rates for the cohort of women born 40–44 years prior to survey, that is in the mid 1950s. In each region, it is clear that the women who conform to the intentional state of fertility control—who want no more children and have used contraception—had *higher* marital fertility in their 20s than did women who continue to want children, while their marital fertility in their 30s closely resembles that of the natural fertility group. This stands in sharp contrast to the European pattern on which the model is based, where fertility at younger ages would have been the same, and fertility control was marked by sharp decreases in fertility at older ages. There, the substantial declines in marital fertility at older ages indexed the intention to stop bearing children and signaled an incipient fertility decline. Among African women who came of age in the decade after independence, by contrast, the intention to stop bearing children in one's 40s indexes a history of particularly prolific childbearing: total marital fertility rates for these women are over 7.5 children in all 18 countries.

Theories of fertility decline focus centrally on intentional action. But differences in fertility levels can arise for a variety of reasons unrelated

[11] The exclusive focus on marital fertility is an aspect of all the models of natural and controlled fertility based on European and North American data, and one that applies poorly to African contexts, where extramarital fertility often plays an important role (see, e.g., Johnson-Hanks 2003). Nonetheless, for the sake of comparison, I retain this element of the model throughout the article.

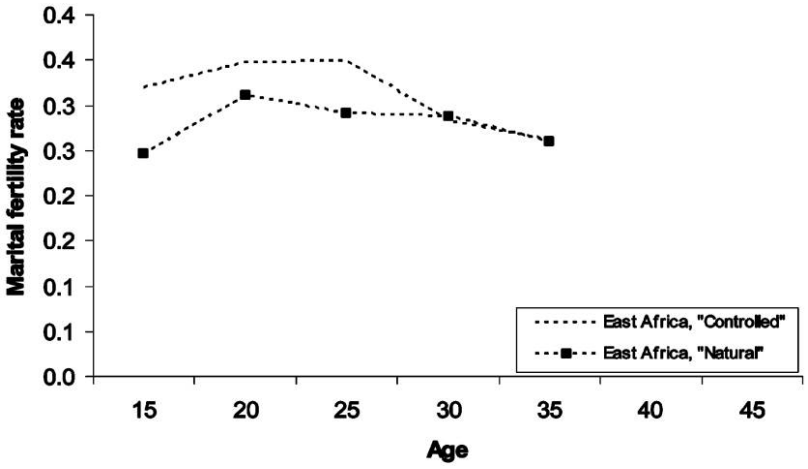

FIG. 1.—Cohort age-specific marital fertility rates for women conforming to the intentional states of natural and controlled fertility, East Africa.

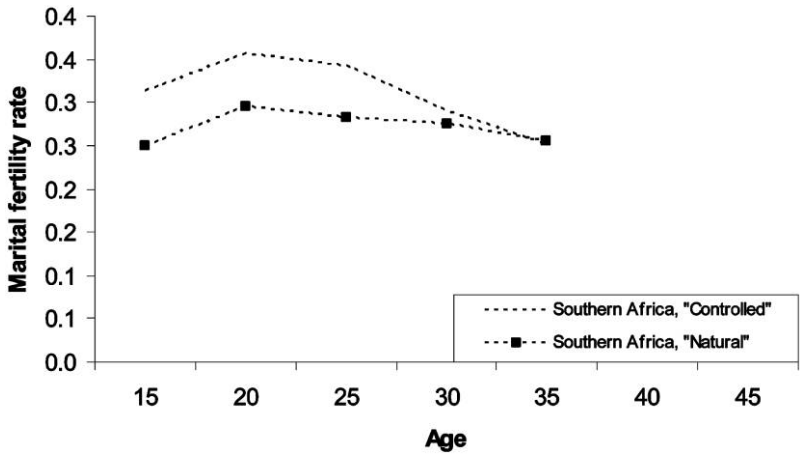

FIG. 2.—Cohort age-specific marital fertility rates for women conforming to the intentional states of natural and controlled fertility, Southern Africa.

to reproductive decision making, as Davis and Blake (1956) pointed out long ago. For this reason, Coale and Trussell suggest that intentional fertility limitation be inferred not from levels of marital fertility, but from its shape over age, indexed to the rates for women ages 20–24 for clear comparability. In natural fertility populations, fertility will decline only as a function of declining fecundability and coital frequency; thus, it

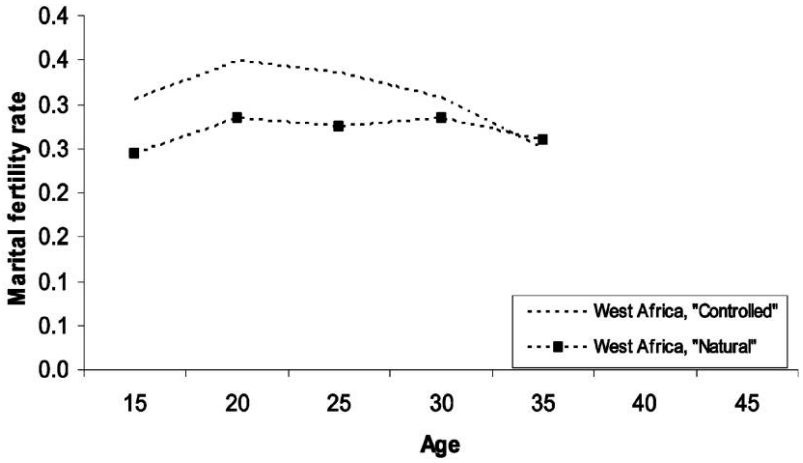

FIG. 3.—Cohort age-specific marital fertility rates for women conforming to the intentional states of natural and controlled fertility, West Africa.

declines slowly at younger ages and more rapidly at older ones. In controlled fertility populations, couples will begin to intentionally stop childbearing as they reach their desired family sizes; fertility therefore declines rapidly at young ages, and more slowly at older ones. In cross-sectional data, these patterns might be obscured as women in different cohorts follow different reproductive trajectories. However, in cohort data such as I am showing here, the model unambiguously predicts this divergence. Yet, the divergence does not appear. Figures 4, 5, and 6 show the indexed age-specific marital fertility rates, superimposed on the expected values from the model. In all three regions (West, East, and Southern Africa), the "natural" and "controlled" fertility subpopulations are identical and track—or even exceed—the values given by Coale and Trussell for natural fertility. Notice that the curves for women with natural fertility lie slightly above those for controlled fertility in all three regions. This conforms in direction, although not in degree, to the prediction of the Coale-Trussell model. Yet, from figures 1–3, we know that the indexed values are higher not because older-age fertility is more sharply curtailed, but rather because younger-age fertility is higher among the women who want no more children and have used contraception.

This finding is well in keeping with what is known about African fertility: spacing is more important than stopping. In an elegant synthetic analysis, Cohen (1998) has shown that declines over time within African countries in the levels of fertility are not associated with changes in the age pattern of fertility. The data shown in figures 1–3 demonstrate that the same is true for subpopulations within a specific cohort. African

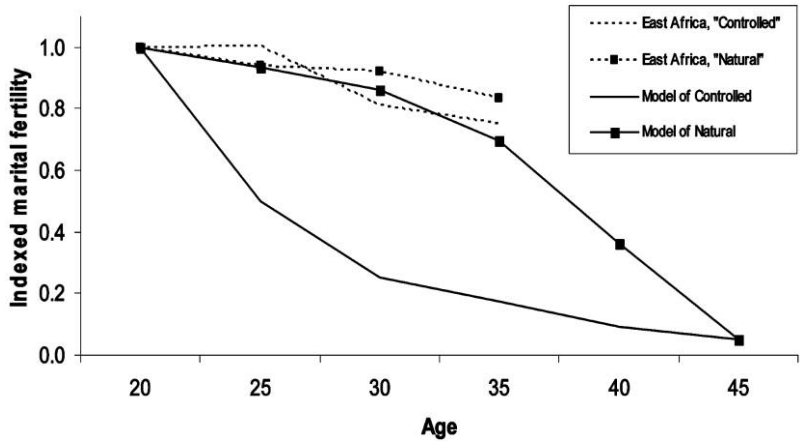

FIG. 4.—Age-specific marital fertility rates indexed to marital fertility ages 20–24, for the cohort ages 40–44, East Africa.

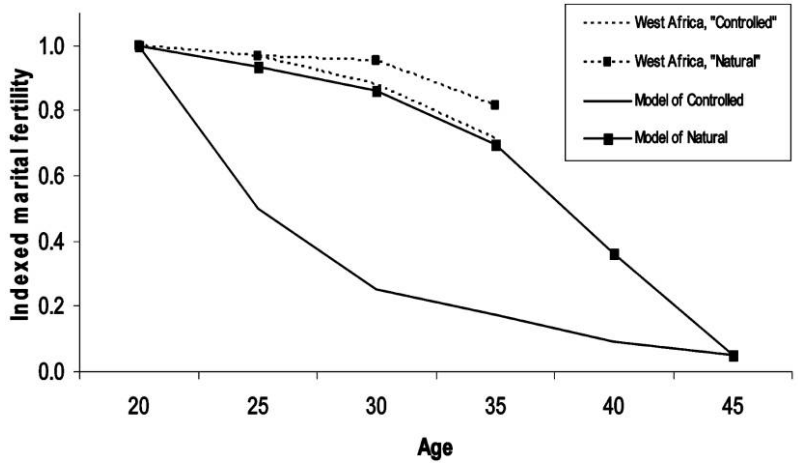

FIG. 5.—Age-specific marital fertility rates indexed to marital fertility ages 20–24, for the cohort ages 40–44, West Africa.

women who express the intentions that define natural fertility have reproductive patterns over age identical to their conationals who are explicitly controlling their fertility.

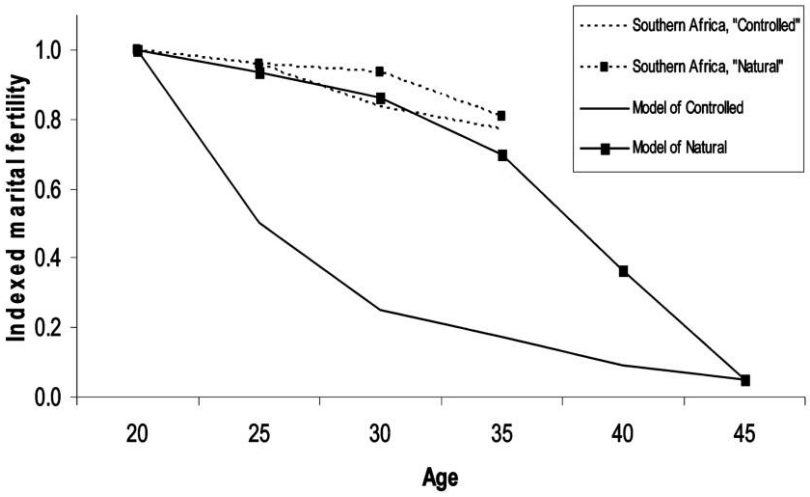

FIG. 6.—Age-specific marital fertility rates indexed to marital fertility ages 20–24, for the cohort ages 40–44, Southern Africa.

PARITY-SPECIFIC BIRTH INTERVALS IN AFRICA

Beside a certain pattern of age-specific marital fertility rates, the best-established indicator of natural fertility is a certain configuration of parity-specific interbirth intervals: a very short first-birth interval, with large increases in the interbirth intervals at low parities, followed by smaller increases at higher parities. This pattern is seen in the data of Henry (1961), Anderton and Bean (1985), Wrigley et al. (1997), and Knodel (1987). In addition to these empirical cases, there are a priori reasons to expect a monotonic increase in birth intervals with parity in populations making no attempts to limit family size after attaining a certain, desired number of children. First-birth intervals—from marriage to first birth—should always be shorter than subsequent intervals, because no period of post-partum amenorrhea contributes to the interval. Any decline in fecundability with age, or coital frequency with marital duration or family size, would imply increasing interbirth intervals over time, age, and parity. Any increase in miscarriage or stillbirth with age would have the same effect. Thus, the pattern found in 17th- through 19th-century European and European-descended populations seems "natural" both in the technical sense of standing for the state in which couples make no conscious effort to limit their fertility after reaching a target number of children, and in the ordinary language sense of "natural" as normal, inevitable, and biologically intrinsic. Thus, it is all the more surprising that data from the DHS suggest that this pattern is not particularly common in Africa,

and is no more common among never-contracepting women than among those who have used contraception.

The First Interval

The challenge to models of natural fertility posed by African birth intervals is particularly strong in relation to the first interval, that is, the interval between marriage and the first birth among women who conceived after marriage. African first-birth intervals are about twice as long as predicted by models or comparative cases. In the societies that Louis Henry identified as having natural fertility (1976), the mean interval between marriage and the first birth was between 15 and 17 months. Anderton and Bean (1985) noted that among 19th-century Mormons, the duration of the first interval did not differ by completed parity, unlike all subsequent intervals; women of all completed parities had mean birth intervals around 15 or 16 months. The stability of the first interval across societies and among women of different completed family sizes within a single society appeared to suggest that fecundability at young ages was largely invariant (see Bongaarts 1978), and legitimated the use of marriage as a proxy for regular sexual intercourse. Over time, the disciplinary assumption that young brides would naturally and universally have conception probabilities of .12 to .2 per month (suggesting mean waiting time to conception of five to eight months) became so strong that both Potter (1963) and Santow (1995) could argue that first-birth intervals over 15 to 18 months are firm evidence of fertility limitation through the use of contraception. By contrast, in all of the sub-Saharan countries analyzed here, women who report having never used contraception have first-birth intervals in excess of 20 months, and in seven countries the average is over 30 months. The weighted average of the first-birth interval among women who report that they have *never* used contraception in all 18 countries taken together is approximately 32 months, or double the interval considered by Potter and Santow as the hallmark of intentional contraception (see fig. 7).

This serious discrepancy has several possible explanations, as explored in detail in Johnson-Hanks (manuscript). First, it is clear that the data on marriage dates are problematic, given the well-known and often-cited processual nature of African marriage (see, e.g., Bledsoe and Pison 1994; Comaroff 1980; Parkin and Nyamwaya 1987). In most parts of Africa, marriage entails multiple life transition rituals, which may occur in a variety of orders. It is not so much that premarital sex and cohabitation are accepted in many parts of the continent, although this is true, but rather that defining "premarital" becomes tricky when alternative ritual events may each be legitimately called "marriage." However, the first

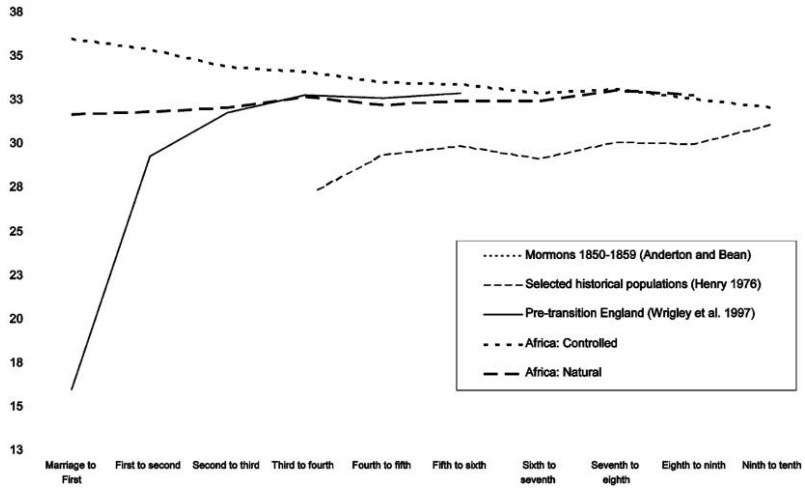

FIG. 7.—Average interbirth intervals by birth order for natural fertility populations and two subpopulations in sub-Saharan Africa (18 country-weighted averages).

intervals are just as long when the analysis is limited to those societies that practice virginity testing and begin coresidence at the payment of bride wealth, that is, those societies that most closely approximate the idealized European marital pattern. This strongly suggests that the processual nature of African marriage cannot account for the discrepant data. A second potential explanation is that the model is wrong. If this is the case, we cannot make inferences about reproductive intentions or actions on the basis of population data, because here the model screams intention and the women assert that not. Finally, the data may be wrong—that is, the women's reports of their children's births or their contraceptive use may be wrong. If this is the case, we cannot do anything useful with DHS self-reported data on ever use of contraception—data on which some thousands of papers have been published in the last two decades, and the basis of analyses of unmet need, analyses that have justified several billion dollars in funding for contraception in poor countries (see, e.g., Bongaarts 1991; Casterline and Sinding 2000). What is more, if women do not even get right whether they have ever used contraception, how much faith should we put in their reports of things like "Have you ever talked to your husband about family planning?"[12] The age-specific marital fertility data suggest that even when 40–44 year old women from 18 African countries tell us they want no more children and have used contraception, they have experienced an age pattern of marital fertility no

[12] A related point is made by Miller, Zulu, and Watkins (2001).

different from that of women who want additional children: low-fertility intentions are invisible. Here, women who say they never contracepted look like standout contraceptors: we have the appearance of certain intentions where the would-be intenders claim there are none.

The case of the first interval offers a striking example of where the social organization of reproduction in Africa requires us to rethink basic assumptions about what is natural about marriage, marital sexuality, and procreation. In analyses of the European and North American transitions, it made sense to treat marriage as the onset of exposure to the risk of pregnancy, because many women abstained from sex until marriage, and most married couples engaged in vaginal intercourse with the expectation of pregnancy on a regular basis starting at marriage. What made childbearing socially appropriate was that it occurred within marriage, and—as the transition to low fertility developed—that the couple restrained themselves from having too many (Schneider and Schneider 1996; Szreter 1996). In much of sub-Saharan Africa, what defines childbearing as honorable and socially desirable is far more nuanced, and can include the timing of births, the visible management of reproductive health, and the choice of partner alongside, and sometimes more important than, the marital status of the mother at the time of conception.

Average Interbirth Intervals by Parity

The interval between marriage and the first birth throughout sub-Saharan Africa is far longer than would be predicted by any model of natural fertility based on European and North American cases. What about the shape of the subsequent intervals by parity? Here, again, we see that African women who have decided to stop bearing children and have used contraception have reproductive patterns very similar to those African women who conform to the description of natural fertility. And again, both groups differ markedly from the comparative European and North American cases. Apparently, the calculus of conscious choice can and does take a variety of forms, only one of which is parity-specific control.

I follow the convention of Henry (1976), Wrigley et al. (1997), and Anderton and Bean (1985) in beginning with the global pattern. Figure 7 shows the average birth intervals by parity from three natural fertility data sets from Europe and North America alongside the 18-country weighted averages for sub-Saharan African women ages 45–49 with natural and controlled fertility.[13] The three European and European-

[13] The line is the weighted average of the country-specific data. The exclusions and definitions used to obtain these populations are important, and I have tried to replicate as exactly as possible Anderton and Bean's methods. Anderton and Bean include all

descended data sets show strikingly similar patterns, differing from the two African curves, which however resemble one another.

Anderton and Bean (1985) argue persuasively that the decelerating increase in birth intervals by parity, shown for the three European-descended data sets in figure 7, is due to composition effects: women who bear more children have shorter intervals at each parity, and at high parities such women are more heavily represented. Dividing the sample by completed parity, then, would show a fan of nearly linear curves, intersecting at the first interval. As Anderton and Bean demonstrate, Mormon women who ended up with fewer children experienced a steeper increase in the duration of interbirth intervals with parity. The same does not hold for African women who desire additional children: curves calculated in the same manner are U-shaped rather than linear, and the difference between the greatest and the shortest interval is small—not more than 10 months for women of any completed parity, in contrast to 16 to 25 months' difference among the Mormon subpopulations. That is, African women's birth intervals differ less by parity than do the intervals of European and North American women, even when all the populations are practicing natural fertility. This is shown in figures 8, 9, 10, and 11.

The contrast between the basically linear shape of the Mormon intervals by parity and the parabolic curves of birth intervals among African women holds formally as well as visually, as well as when the first interval is removed, and when natural and controlled fertility subpopulations of African women are distinguished. This is demonstrated in the tables. Table 1 shows the best-fit linear equations for the 12 series of intervals without the first interval (i.e., equations in the first row are fitting three points, the second five points, etc.). These equations predict the first interval for Africans with controlled fertility relatively well, whereas they dramatically underpredict the first intervals for the natural fertility African sample (by 20 months for women completing their reproductive lives with four children!). The first intervals for the Mormons are overpredicted by about five months (not shown).

Table 2 shows the R^2 for each linear equation. For the Mormons, linear equations fit all four series very well, accounting for the vast majority of

intervals for all women who had only marital conceptions and remained in their first marriage at least through age 49. I include all intervals for all women ages 45 and older, who are still in their first union (that is, report being currently married and having ever had only one union), and who had only marital conceptions. Because the DHS only records the dates of pregnancies that led to live births, this last constraint means that all their live-born children were born at least eight months after their reported date of marriage. It is because this procedure produces small numbers of women in each country (even more so when divided by completed parity, as below) that I present only the weighted averages for all countries together. At the country level the story is essentially the same, only substantially messier.

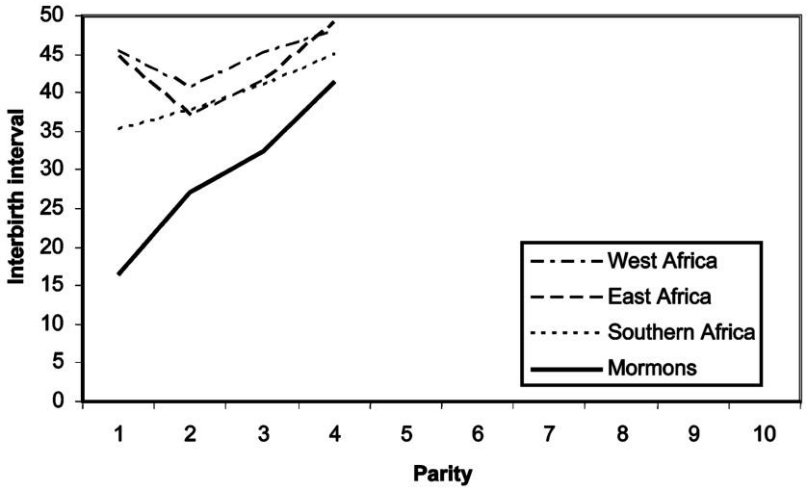

FIG. 8.—Average interbirth intervals by birth order for women ages 45–49 with completed parity of four children.

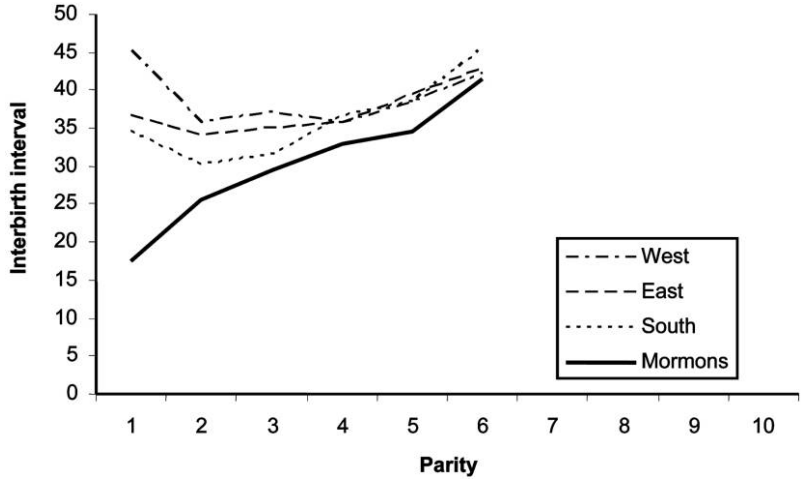

FIG. 9.—Average interbirth intervals by birth order for women ages 45–49 with completed parity of six children.

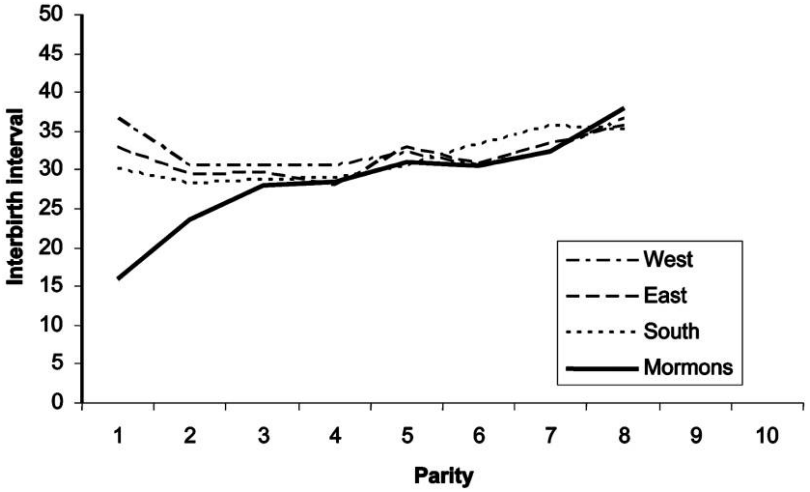

FIG. 10.—Average interbirth intervals by birth order for women ages 45–49 with completed parity of eight children.

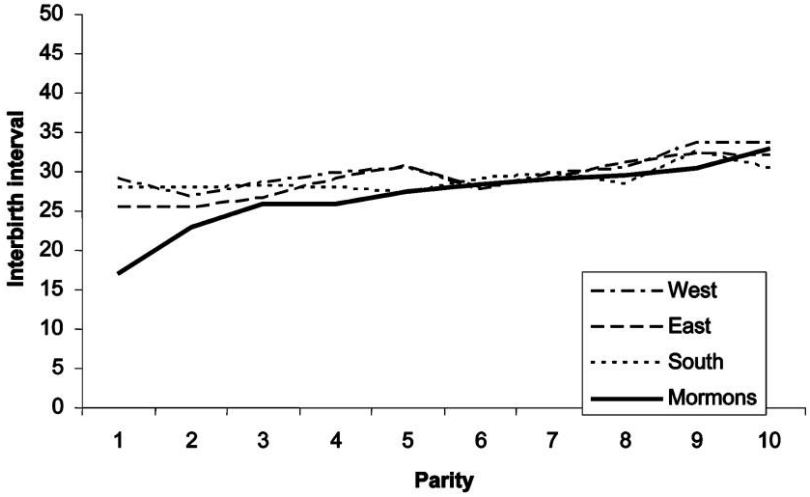

FIG. 11.—Average interbirth intervals by birth order for women ages 45–49 with completed parity of 10 children.

TABLE 1
BEST-FIT LINEAR EQUATION FOR BIRTH INTERVAL MEANS (y) BY PARITY (x), ESTIMATED WITHOUT THE FIRST INTERVAL

		CONTEMPORARY SUB-SAHARAN AFRICA	
Completed Parity	Mormons, 1850–59	Natural	Controlled
4	y = 7.25x + 11.92	y = 4.97x + 29.27	y = 7.80x + 19.21
6	y = 3.72x + 18.01	y = 2.42x + 28.40	y = 3.35x + 24.02
8	y = 1.95x + 20.55	y = 1.10x + 27.21	y = 1.63x + 24.75
10	y = 1.03x + 21.91	y = 0.76x + 25.33	y = 1.06x + 23.22

variation in all cases. Among the African subpopulations the fit is much poorer. All four are poor among the controlled fertility subpopulation, whereas among those identified as natural fertility, the linear equation fits the first two series well, but fits poorly for the pattern of birth intervals among women who bore eight or ten children.

Improving fit for the African data requires using a more complicated equation. I considered five possible functional forms, under the joint constraints that (1) all four series had to be fit with the same form of equation, and (2) in order to prefer a more complex equation over the linear equation, the average increase in fit over the four equations had to be at least 5%.[14] Table 3 shows, as would be suggested visually, that the quadratic form fits the African series far better than do the linear equations, while nothing improves on the linear fit of the Mormon data. The improvement in fit is shown in table 4.

Thus, I conclude that the shape of the curves describing mean birth intervals by parity differ fundamentally between the African and Mormon data, whereas the two African series—controlled vs. natural fertility—demonstrate the same underlying shape. The quadratic shape of the African data, while dramatically different from the presumed "natural" shape of monotonic increase, is not unique. Leridon (1988, p. 27) finds a similar shape for rural Japan in 1940. Leridon argues that the key reason for this difference is age at first marriage: the linear increase in birth intervals among the Mormons and Europeans, he argues, relates to their relatively late marriage; when women marry early, as in the Japan sample and in contemporary sub-Saharan Africa, the first couple of births may even occur at ages when biological fecundity is *increasing*. Leridon further argues, as would I, that birth spacing is as "natural" a mode of fertility

[14] I considered the following possible functional forms, seeking to balance simplicity with descriptive power: linear ($y=ax+b$), logarithmic ($y=a*Ln[x]+b$), exponential ($y=a*e^{bx}$), power ($y=a*x^{b}$), and quadratic ($y=ax^2+bx+c$).

TABLE 2
R^2's for Equations Shown in Table 1

		Contemporary Sub-Saharan Africa	
R^2	Mormons, 1850–59	Natural	Controlled
4	.9809	.9933	.7635
6	.9587	.8686	.6669
8	.8882	.5836	.7167
10	.9437	.6919	.6723

limitation as is parity-specific control, and that birth spacing requires substantially more analytic attention than it has received to date.

DISCUSSION: ON PARITY-SPECIFIC CONTROL AND UNCERTAINTY

I have shown that the assumed indexical relationship between specific patterns of birth rates and the intentional states and forms of reproductive action called natural fertility does not hold in contemporary Africa. African women who have sought to limit the number of children that they bear—women with controlled fertility—are largely indistinguishable from their natural fertility conationals on the measures designed to detect fertility control (Coale and Trussell's M&m and the shape of parity-specific interbirth intervals). Similarly, African women who have never made any conscious effort to limit births—that is, women practicing natural fertility—have reproductive patterns very different from those anticipated by theory or comparison to historical Europe. This does not mean that African women are irrational, or that they are acting ineffectively. Rather, it means that the cultural repertoires through which they organize their action (in Swidler's langauge), or their schemas of action (in Sewell's), differ so much from those built into the quantitative models that the models misattribute their intentions. These findings thus relate to recent work on theories of intentionality and unmet need, and pose new questions about what is "natural" about natural fertility, and about the relationship between population rates and individual motivation and action more broadly.

On the Limits of Intentions

I have shown that women's stated reproductive intentions are invisible to the set of formal methods designed to infer them. This is not *solely* because reproductive intentions are a particularly problematic kind of

TABLE 3
R^2's for Best-Fit Quadratic Equation for the Same Data

		Contemporary Sub-Saharan Africa	
R^2	Mormons, 1850–59	Natural	Controlled
4	1.000	1.000	1.000
6	.9667	.9933	.9504
8	.8924	.8665	.8332
10	.9443	.8334	.9006

intention to fulfil, but it is in part for that reason. Statistical formalisms that make claims about social meaning by relying on an indexical relation between (observable) outcome and (unobservable) intentions, aspirations, or interpetations require that relation to be stable. In the case of reproduction, it is not. Klerman (2000, esp. p. 160) has argued that even in the United States fertility intentions as reported are unstable and not particularly predictive; similar concerns have been expressed by Trussell, Vaughan, and Stanford (1999), and Schaeffer and Thompson (1992). These concerns respond, in part, to a literature that examines the relationship between stated intentions and subsequent fertility outcomes (Campbell and Campbell 1997; Desilva 1992; Jones, Paul, and Westoff 1980; Miller and Pasta 1995; Morgan 1982; Nair and Chow 1980; Schoen, Astone, Kim et al. 1999; Schoen, Astone, Nathanson et al. 2000; Tan and Tey 1994; Vlassoff 1990; Westoff and Ryder 1977). The results of these studies have been mixed, in part because of their varying research methods and in part because of the different socioeconomic contexts in which the studies were done. Researchers have generally found statistically significant effects of prior intentions on subsequent behaviors; however, the proportion of "inconsistencies" (a term used by Westoff and Ryder, and Desilva) is always significant, and sometimes quite large. The lowest rates of inconsistency are found in the publications of the National Fertility Study, which used data from white American women in the first 20 years of their first marriages, interviewed in 1970 and 1975.[15] Westoff and Ryder (1977) report that 34% of women who said in 1970 that they wanted another child had not borne one by 1975, while 12% of women who said that they wanted no more had nonetheless given birth to an additional child. Altogether, the "inconsistency ratio" was 20.9% over the five-year period.

Because of the selection of women into the National Fertility Study, their "inconsistency" results might be considered a lower bound. Women who divorced or were widowed—that is, women whose life circumstances

[15] Recall that this survey was one of the bases for questions in the DHS.

TABLE 4
PROPORTIONAL DIFFERENCE IN FIT QUALITY

		CONTEMPORARY SUB-SAHARAN AFRICA	
R^2	Mormons, 1850–59	Natural	Controlled
4	.0193	.0067	.3097
6	.0084	.1436	.4252
8	.0047	.4847	.1626
10	.0007	.2046	.3396
Weighted average ...	.006	.249	.302

changed dramatically and unpredictably—were excluded from the study. Together, these forms of sample-selection bias likely reduced the proportion of women who failed to have an intended child. Pathological sterility is relatively rare in the United States, and the sample was limited to younger women; thus, the proportion of women physically unable to bear a desired child would be relatively low. Also, contraception was—by international standards—easily available throughout the reference period, and abortion was legalized in the middle of it (1973), factors that should lead to relatively low rates of undesired/unintended births. At the same time as these factors suggest an overestimation of the importance of intentions, however, the formulation of the questions might be thought to lead in the opposite direction. The original question about reproductive intentions asked only "Do you want another child?" with no temporal referent, referent to the survival of the current child or sex of the future one, or mention of alternate potential futures in which childbearing might be more or less desirable. Thus, many of the women whose reported intentions and subsequent behaviors were apparently "inconsistent" may indeed have succeeded in fulfilling some set of reproductive intentions that were simply outside the frame of the researchers' questions. Perhaps couples intended another child only under certain financial circumstances, and the observed discrepancies arose because the couples predicted poorly whether such financial circumstances would come about. Because of these competing sources of bias, it is impossible to know how to interpret the results of the National Fertility Survey.

Two recent publications (Schoen, Astone, Kim et al. 1999; Schoen, Astone, Nathanson et al. 2000) also use large-scale U.S. data, improving on the methods of the National Fertility Survey. The authors find that reported fertility intentions have large and statistically significant effects on subsequent reproductive outcomes, although discrepancies between reported intention and action remain substantial. Methodologically sophisticated, these studies nonetheless have two drawbacks. First, their

primary measure of reproductive intentions is desired family size. Desired family size may be key to reproductive decision making, but whether it is, or under what conditions, is itself an empirical question; given that most U.S. couples have two children, the meaning of an intention to have two is unclear. Second, like the National Fertility Survey, this study focuses on non-Hispanic whites in the United States: arguably an unusual population in its inclination explicitly to formulate, and in its ability to achieve, its reproductive goals.

Research on reproductive intentions and outcomes in developing countries has been limited, and the results quite disparate. Campbell and Campbell (1997) argue that fertility intentions have a significant influence on future fertility behavior in Botswana, and that sex differences are small except in reference to desire for additional sons. Desilva (1992) found that nearly 30% of women in a Sri Lankan survey had outcomes discrepant to their stated intentions just three years later. In Taiwan, Nair and Chow (1980) found that couples who wanted no more children had measurably lower fertility than did couples who wanted more, although over 30% of the couples wanting no more did indeed bear a child over the three-year interval. Tan and Tey (1994) argue that Malaysian women's fertility is well predicted by their stated intentions, whereas Vlassoff (1990) found no relationship between Indian women's reported desired family size and their fertility 10 years later.

When reported intentions and outcomes do not correspond, there are at least five possible explanations: (1) sterility, unmet need, and contraceptive failure lead to random variation in reproductive outcomes; (2) individuals do not make reproductive decisions alone, and so the interview subject's intentions may be irrelevant to the actions taken; (3) intentions change over time, so that the intentions reported at time of survey may have little relationship to intentions at time of reproductive action; (4) intentions may be held only weakly, and therefore never be enacted; or (5) intentions may be poorly measured, either because the respondent gives incomplete or erroneous answers, or because the questions are ill formed or measure an irrelevant aspect of intentions. All of these are likely at work in the African cases. However, this article goes one step further, showing that even when African women *do* act on their reported intentions to limit childbearing by using contraception, they do so in fundamentally different ways than in the West. There is no reason that the intention to limit family size, for example, must be accomplished by having short birth intervals followed by the total cessation of childbearing, as happened in Europe. In Africa, we see quite a different pattern. The standard methods for detecting fertility-limitation intentions fail to identify those intentions in Africa, because the specific associations between intention and forms of action assumed in the models do not hold.

African Exceptionalism?

What is there about reproduction in Africa that differs so dramatically from the historical cases? The different role of marriage and the importance of child spacing are well known. These two characteristics of fertility regimes in Africa alone might call into question the assumed universality of the natural versus controlled fertility distinction. But the problems are more profound. For women and couples in many African societies, child numbers—and particularly the concept of stopping childbearing after reaching a specific, desired family size—do not have the centrality that they acquired in the European fertility decline. In many contexts in Africa, neither women who want few, nor women who want as many children as God will give them, would say that the number of ever-born children is itself all that important.

The way in which people from many African societies think about childbearing stands in sharp contrast to the standard view in contemporary, international demography. The changes in reproductive practice now occurring in Africa are not recapitulations of the fertility transition in Europe (Caldwell et al. 1992; Cohen 1998). Much of African reproduction conforms neither to the definition of natural nor of controlled fertility, but represents some third, not intermediate, but frankly different, regime. On the basis of my ethnographic work, I would argue that this regime is related to the fact that life in Africa is extremely uncertain and the requirements for success are changing and ambiguous (see Bledsoe 2002; Ferguson 1999; Whyte 1997). Parents cannot reliably trade child quality for child quantity, or predict that the foreign models of reproduction that now appear promising will not fall apart tomorrow. Prices for schooling, healthcare, or housing are extremely unstable, as are wages; even government employees are not paid reliably in some countries. Most employment opportunities are filled through social networks or kin relations, rather than according to formal skills or job experience; few people have access to formal credit. Buses do not run on schedule. Electricity and running water go out regularly, even in capital cities. In the rainy season, roads get washed out. Insect-borne diseases like malaria seem to strike more or less at random; the water-borne and sexually transmitted ones, from cholera to HIV/AIDS, only marginally less so. Mortality rates at all ages are high, and death often unpredictable. Witchcraft and corruption thwart schooling aspirations, marriage plans, health, and welfare. To some degree, this radical uncertainty is a straightforward consequence of life in a poor country with weak institutions and underdeveloped infrastructure. But the hardships that people face in modern Africa are also the result of the continent's awkward partial integration into the global

economy. Africans are not only poor and getting poorer, but they are getting poorer while watching the rest of the world getting richer.

Elsewhere I have argued that under these conditions, utility maximization following the principles of rational choice is ineffectual. To understand this, imagine a simple game in which I offer you sums of money and you either accept or reject them. Once you accept an offer, the game ends. If you reject an offer, you cannot return to it later, and if I run out of offers without your having chosen any, you get nothing. As long as the parameters of the game are well defined (a known number of turns, a known distribution of amounts), your task can be reduced to a simple maximization problem. But as those simplifying constraints are lifted (there might be 20 rounds, or 43, or 1; the offers might come in cash, or goats, or lottery tickets; my offers might be lies), the game becomes unsolvable. That is the problem of life in modern Africa: the rules of the game are unknown and constantly changing. When maximizing becomes impossible, people nonetheless continue to engage in social action, but in another modality. One practiced widely in southern Cameroon and urban Burkina Faso could be called "judicious opportunism" (Johnson-Hanks 2005), where instead of selecting a desired end and locating the most efficient means to achieve it, the actor remains open, flexible, and ready to jump at whatever surprising opportunity comes along.[16] Instead of clearly demarcated strategies or trajectories, people cultivate possibilities (Guyer 1996). Instead of following strictly ordered life stages, people keep open the option to return to school or their natal home, to start over with a new spouse, or to return to childbearing after a long hiatus (Johnson-Hanks 2002*a*). People have three jobs, maintain elaborate networks of friends and kin, and foster their children to a variety of potentially helpful people (Bledsoe 1990). Like all resources in contemporary Africa, the value of reproduction lies in the possibilities that it keeps open. Childbearing may be a suitable response to a wide range of life contingencies; reproductive action is therefore dependent on many more things than in the contemporary United States. This uncertainty does not mean that fertility in general is outside of what Coale famously termed the "calculus of conscious choice," but rather that the mental schemas for doing that calculus are based more on short-term, often unpredictable configurations of kinship, livelihood, and opportunity than on parity or stable preferences.

In interviews, women in southern Cameroon make this kind of rea-

[16] It is my intuition that judicious opportunism is practiced widely; however, I have first-hand knowledge of only these two contexts.

soning explicit.[17] For example: "For the moment, I haven't yet thought about the future. But in any case, whatever opportunity appears, that is what I will do." Or similarly, "I do not yet have a precise idea, you see. I am waiting. If I succeed, if the exams come out in success, then tomorrow I will tell you what's what. . . . Today, is it necessary to like something? Whatever presents itself in front of you, you do." This cultural logic applies to fertility as well. Although women can and do answer questions like "Do you want any more children?" or "If you could choose, how many children would you want?" they are also quick to point out the many possible events that would lead them to change their minds. Divorce or remarriage, a new co-wife, the death of a child, financial hardship, and problems with witchcraft were regularly named as reasons to have more or fewer children than planned. As one woman explained: "As for the future, we cannot know it. Perhaps I will want a child. Perhaps I will not want any more children. Perhaps God will give me a child. Perhaps not. With the future, there is no knowing!" The point is not that these women are careless, but that their reproductive action responds to conjunctures that emerge—often unpredictably—over time (see Bledsoe 2002). Thus African women who want additional children and have never used contraception are not fundamentally different from their compatriots who want to stop childbearing and have used contraception: they have simply faced a different history of conjunctures. Instead of following long-run strategies assuming a single marriage and based on parity, women are reasoning about whether now is a propitious time to have a child with this man under these social circumstances. In many African societies, childbearing is very much subject to the calculus of conscious choice without child numbers being part of the equation.

This article ends with three conclusions, one uncontroversial, and the others somewhat more so. The uncontroversial conclusion is that we need to be very cautious about inferring intentional states from population rates, and vice versa. While it is philosophically defensible to argue that an intention is the cause of an action (see Searle 1983 for a discussion), intentions do not cause rates, and the link between them can be highly contingent and surprisingly variable. A set of rates can only stand for a set of intentions in relation to some social ground; changes in the ground change the standing-for relation between quantitative regularities and social meanings. In a somewhat more contentious vein, I conclude that there are a variety of modes of reproductive management, of which parity-specific control within marriage is only one. African women who do not desire to limit the number of children they bear nonetheless exert con-

[17] A description of the fieldwork from which these quotes are taken is in Johnson-Hanks (2006).

siderable conscious effort in organizing and administering their reproductive careers, and this organization is demographically consequential. The question is not why some populations control their fertility and others do not, but rather why the *number* of children sometimes becomes the single most important object of reproductive management. Reproductive management of some form, however, is probably universal.

Finally, I return to Weber's admonition that causal explanation in the social sciences requires both adequacy at the level of meaning and related patterns of statistical regularity, to argue that very little of our local knowledge about social behavior and its meanings can be transported across borders. Even something as seemingly transparent as fertility control cannot be understood in the categories of universalistic rational choice. Behaviors that in one context index the intention to have "as many children as God gives" in another context index nothing at all, because they are shared by women who are limiting childbearing and those who are not. Without local knowledge, the translation from rate to meaning is impossible. Demeney (cited in Coale 1973, p. 64) claimed that "In traditional societies fertility and mortality are high. In modern societies fertility and mortality are low. In between, there is demographic transition," placing reproductive change firmly into a unilineal, modernizing framework. But populations across much of the contemporary world defy such categories. In Dakar, Katmandu, and Caracas, new, interstitial, and ambiguous social forms and demographic regimes are emerging. These are not simply demographic systems in transition from one classic European model to another, but have instead distinct repertoires of alternatives, structures of incentives, systems of value, and horizons of possibility (see Sewell 1992; Swidler 1986). If we assume a single, transparent rationality, we will fundamentally misunderstand the statistical patterns we observe.

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