



# COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

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TITLE OF PROPOSED PROJECT <b>Culture and Individual Adaptation</b>						
REQUESTED AMOUNT \$ <b>293,421</b>	PROPOSED DURATION (1-60 MONTHS) <b>30</b> months	REQUESTED STARTING DATE <b>06/01/01</b>	SHOW RELATED PREPROPOSAL NO., IF APPLICABLE			
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## CERTIFICATION PAGE

### Certification for Principal Investigators and Co-Principal Investigators:

I certify to the best of my knowledge that:

- (1) the statements herein (excluding scientific hypotheses and scientific opinions) are true and complete, and  
 (2) the text and graphics herein as well as any accompanying publications or other documents, unless otherwise indicated, are the original work of the signatories or individuals working under their supervision. I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if an award is made as a result of this proposal.

I understand that the willful provision of false information or concealing a material fact in this proposal or any other communication submitted to NSF is a criminal offense (U.S.Code, Title 18, Section 1001).

Name (Typed)	Signature	Social Security No.*	Date
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### Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding Federal debt status, debarment and suspension, drug-free workplace, and lobbying activities (see below), as set forth in Grant Proposal Guide (GPG), NSF 00-2. Willful provision of false information in this application and its supporting documents or in reports required under an ensuring award is a criminal offense (U. S. Code, Title 18, Section 1001).

In addition, if the applicant institution employs more than fifty persons, the authorized official of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of Grant Policy Manual Section 510; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflict which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

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This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

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AUTHORIZED ORGANIZATIONAL REPRESENTATIVE	SIGNATURE	DATE
NAME/TITLE (TYPED) <b>Robert L. Wells, Asst Acad VP/Res.</b>		<b>07/17/00</b>
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## A. Project Summary

The influence of culture on individual adaptation has been a question of considerable importance in anthropology and other social sciences; however, theoretical and methodological difficulties have limited the ability of researchers to directly investigate these processes. The aim of this proposal is to investigate cultural, social-psychological and dietary influences on individual differences in physiological and psychological adaptation. Individual differences in physiological and psychological variables (such as blood pressure serum lipids, anxiety and depression) have most often been attributed to individual-level factors such as diet, or individual psychological differences in the experience of stresses. This research, drawing on innovations in culture theory and methods, will examine more closely the role of culture in the process of individual adaptation.

Current theories in cognitive anthropology define culture as a series of overlapping cultural models. Cultural models are schematic cognitive representations of socially significant phenomena that are shared by individuals in a social group. These cultural models construct meaning for individuals and serve a directive function for individual behavior. There are three sources of variation in cultural models. First, individuals will incompletely share cultural models of any cultural domain. Second, there may be different (even competing) models of any cultural domain. And third, individuals may, for a variety of reasons, be limited in their ability to act on shared cultural models and hence engage in the behaviors or adopt the beliefs defined by those models.

The term “cultural consonance” has been proposed to describe the degree to which individuals in their own behaviors approximate shared cultural models for beliefs and behaviors. It is hypothesized that higher cultural consonance in specific cultural domains will be associated with better physiological and psychological adaptation, as measured by lower blood pressure, a more favorable pattern of serum lipids, and fewer symptoms of psychological distress. Furthermore, it is hypothesized that cultural consonance will moderate the associations of social-psychological stressors with adaptation outcomes, and that both the direct and interactive associations will be independent of diet and demographic variables.

This research will be carried out in the city of Ribeirão Preto, Brazil. Ribeirão Preto represents an appropriate research site because of the considerable amount of sociocultural and dietary variability within the community. The research will be conducted in three stages and will be carried out in four socioeconomically diverse neighborhoods. First, unstructured interviewing will be used to elicit the cultural domains of relevance to individual adaptation. In Brazil, it is anticipated that these domains will include shared beliefs about hierarchy in social relationships, models of the successful lifestyle, kin and nonkin patterns of social support, and individual flexibility in coping. Second, cultural consensus analysis will be used to test specifically for shared knowledge and understanding in these cultural domains. Third, data on individual psychobiological adaptation; self-reports of behaviors and beliefs relevant to the cultural domains; social-psychological stressors; and, dietary, body composition and demographic variables will be collected from a representative sample. Cultural consonance will be measured by assessing the match between cultural consensus models of cultural domains and individual self-reports of beliefs and behaviors. Data will be analyzed using appropriate statistical models to test hypotheses both of direct and interactive associations with adaptational outcomes.

These results will contribute to the development of biocultural models of individual adaptation and to an elaboration of culture theory.

## TABLE OF CONTENTS

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For font size and page formatting specifications, see GPG section II.C.

Section	Total No. of Pages in Section	Page No.* (Optional)*
Cover Sheet (NSF Form 1207) (Submit Page 2 with original proposal only)		
A Project Summary (not to exceed 1 page)	1	_____
B Table of Contents (NSF Form 1359)	1	_____
C Project Description (plus Results from Prior NSF Support) (not to exceed 15 pages) <b>(Exceed only if allowed by a specific program announcement/solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)</b>	15	_____
D References Cited	4	_____
E Biographical Sketches (Not to exceed 2 pages each)	4	_____
F Budget (NSF Form 1030, plus up to 3 pages of budget justification)	9	_____
G Current and Pending Support (NSF Form 1239)	2	_____
H Facilities, Equipment and Other Resources (NSF Form 1363)	1	_____
I Special Information/Supplementary Documentation	0	_____
J Appendix (List below. ) <b>(Include only if allowed by a specific program announcement/ solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)</b>	_____	_____
Appendix Items:		

\*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

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## **B. PROJECT DESCRIPTION**

### **Statement of the Problem**

Does culture, defined as the shared knowledge guiding social interaction and other behaviors within a social group, influence individual psychobiological adaptation? Can the links between culture, individual behavior, and individual psychobiological adaptation be traced? This continues to be a fundamental question facing anthropology (Dressler 1995; Baker 1997; Goodman and Leatherman 1998). Years of anthropological research rooted in the “modernization” paradigm suggests that as traditional communities come under the influence of the market economies of the industrial and post-industrial world, individual psychobiological adaptation changes, with increases in blood pressure, serum lipids, serum glucose, and reported symptoms of depression and anxiety. Changing systems of knowledge, meaning, and understanding are thought to play a role in this process, but it has proven extremely difficult to identify just what that role is, relative to changing patterns of behavior and diet. In part, this has been because researchers have not used the best available theoretical and methodological tools available to them (Dressler 1995; 1999).

This research will use recent developments in theories of cultural models (Shore 1996; Strauss and Quinn 1997), along with methodological procedures to identify cultural consensus (Romney, Weller and Batchelder 1986), and recent innovations in theory and methods to link cultural consensus to individual behavior (Dressler 1996a; Dressler, Santos and Balieiro 1996; Dressler, Baliero and Santos 1997; 1998; 1999; Dressler and Santos 2000; Dressler and Bindon 2000), in order to study cultural influences on human psychobiological adaptation. These cultural influences will be examined in interaction with social-psychological factors and in contrast to dietary influences.

### **Theoretical Background**

Individuals differ along psychophysiological dimensions described by psychologists and physiologists as “levels of arousal” and “reactivity.” These refer to linked psychobiological processes that include autonomic nervous system activity; the levels of circulating hormones such as cortisol and epinephrine; and, perceptual and attentional activity. These parameters describe both the day-to-day state of the organism and the degree of flux in psychobiological systems in response to external stimuli, large and small. These levels of arousal and reactivity are, of course, difficult to observe outside of controlled laboratory conditions. More easily observed, however, are the outcomes of individual differences in arousal and reactivity. These include easily measured phenomena such as arterial blood pressure and serum lipids, as well as subjective feelings of well being such as depression and anxiety. These variables can usefully be thought of as measures of the outcome of individual adaptation to environmental stimuli. (Furthermore, these variables are the proximate precursors to earlier mortality in more highly developed and developing societies.) It has been well established in this area of research that social stimuli are among the factors that elicit adaptive efforts by individuals. As individuals respond to environmental stimuli, they set into motion psychobiological processes. If individuals are able successfully to meet challenges and avoid threats, levels of arousal can be maintained appropriately. If, however, individuals are unable to successfully meet such challenges or avoid threats, it appears that adaptive efforts persist in such a way that levels of arousal remain inappropriate, leading to deleterious outcomes such as persistently elevated arterial blood pressure (Lipp 1996; McEwan and Stellar 1993).

This is a thumbnail sketch of what in social science is described as “the stress model.” Researchers, coming primarily from psychology (Scheier and Bridges 1994) but including some anthropologists (Dressler 1995b), have engaged in constructing quite detailed social-psychological models of the stress process. The original empirical basis for examining the links between social variables and individual adaptation rested on three basic observations: (a) individuals in urban societies having low material

resources also exhibit poor adaptational outcomes (Thomas 1998); (b) individuals who are linked into a network of social relationships exhibit better adaptational outcomes (Berkman 1994); and, (c) as communities in developing societies come under increased influence from industrial, capitalist, market societies, adaptational outcomes in those communities change (Dressler 1999). There is, however, a curious paradox in this research literature. The development of ever more precise social-psychological models of the stress process was supposed to account entirely for the general associations of material resources, social networks, and modernization with adaptational outcomes. This has not, however, turned out to be the case. As numerous researchers in the area have commented (Adler et al. 1994; Kaplan 1994; Baker 1997), the construction of very precise social-psychological models has left at least part of the fundamental association between these general indicators of social position and adaptational outcome unexplained. And of course, stress models were developed precisely because more conventional sorts of factors (such as diet, physical activity, sanitary living conditions, and others) failed to account for these observations.

Could the association of social position and adaptational outcome be mediated in part by culture? Some ethnographic researchers have used culture theory to guide the measurement of variables in the stress model, and they have used culture theory as an interpretive framework for results. This approach has been most useful when anthropological researchers have used ethnographic insight to generate novel hypotheses regarding the associations among stressors, resistance resources, and adaptational outcomes. When such novel hypotheses receive empirical support, by implication it is the cultural context that alters the pattern of associations among variables in the stress model (Bindon et al. 1997; Janes 1990; McGarvey 1999).

A more recent approach to examining cultural factors in individual adaptation provides a direct route from the cultural to the biological, based on recent developments in culture theory and ethnographic methods. Dressler and his colleagues (Dressler 1996a; Dressler, Santos and Balieiro 1996; Dressler, Balieiro and Santos 1997; Dressler, Balieiro and Santos 1998; Dressler, Balieiro and Santos 1999; Dressler, Bindon and Neggers 1998; Dressler and Bindon 2000) have developed a model to assess how closely an individual approximates in his or her own behavior the shared knowledge and understanding of his or her own society, a concept referred to as “cultural consonance.” This approach begins with the concept of culture as “cultural model” as this idea has been articulated by cognitive anthropologists (Holland and Quinn 1987; Shore 1996; D’Andrade 1995). A precise definition of cultural model that is uniformly applied has yet to be developed, but there is enough commonality in usage to have a pretty clear idea what is meant by the term. A cultural model is a highly schematized, skeletal representation of some cultural domain, including the elements, structure, associations, and processes within that domain. A cultural model is first and foremost constructive, in that it defines the elements that constitute some domain. There is then a representation of the associations among those elements, how those elements relate to one another and how the domain “works,” so to speak. In deciding what to do in any given situation, or in deciding what the behaviors of others mean in any given situation, we draw on our understanding of the world as that understanding is structured by our cultural model.

Clearly, individuals draw on a large set of cultural models, and these cultural models are related both by association and by abstraction. From one individual to another, there are likely to be considerable differences in the amount and elaboration of the knowledge encoded in cultural models. But regardless of the elaboration of individual cultural models, what makes these models truly cultural as opposed to merely eccentric is that, to some degree, we share these cultural models with other people (D’Andrade 1984). It is the sharing of these more-or-less arbitrary cultural constructions that gives them their tremendous force in the world. And it is the sharing of cultural models that has enabled generations of anthropologists to describe “the” culture of a group. Those cultural models that are widely shared can be usefully abstracted at the group level as the social heritage of a community. It is, furthermore, this property of cultural models that prevents the concept from being reductive, a charge often leveled at

cognitive approaches to culture. Cultural models are certainly present in part in individual minds, but a complete characterization of a cultural model requires an understanding of what is shared between minds.

There are three sources of variability in cultural models within a society. First, as noted, we incompletely share cultural models; therefore, some people will know more (or less) about some domain than others. Second, there may be systematic variability in cultural models across social contexts. Third, individuals may be limited for a variety of reasons in their abilities to act on cultural models; that is, they may know the model, but they may be unable to act in accordance with it (by economic constraints, for example). This third source of variability in individual behavior relative to shared cultural models is captured by the concept of cultural consonance.

The utility of this theoretical orientation has been enhanced considerably by related developments in research methods, specifically the cultural consensus model developed by Romney, Weller and Batchelder (1986). More than an analytic technique, the consensus model has contributed to the elaboration of culture theory by emphasizing the importance of sharing as a defining feature of cultural knowledge. The consensus model enables an ethnographer to determine unambiguously whether there is sufficient sharing in the responses of a group of informants to a set of structured questions to make it reasonable to infer that these informants are all drawing on a single cultural model of that cultural domain. Note that the responses of the informants—their verbal production—is not the cultural model; rather, it can be inferred that the informants are drawing on a shared model of the domain in generating their responses. (In fact, the utility of the cultural consensus model does not require an allegiance to a specific theory of cultural models. Rather, any of the variety of theories of shared mental structures that store and structure cultural content, such as Bourdieu's (1984) concept of "habitus" or Romney and Moore's (1998) concept of "shared cognitive representation," would work. The concept of cultural models is preferred here because it has been most elaborately worked out as a culture theory.)

If the inference regarding sharing can be made, then the consensus model enables the analyst to make two more steps. One step is an estimate of the degree to which an individual informant's knowledge is congruent with the overall model. This is what Romney et al. refer to as "cultural competence." The other step is a best estimate of the culturally appropriate responses to the questions, with "best estimate" understood as the responses that most (and the most competent) informants are likely to make. The concept of cultural consonance can then be used to see how individuals realize in their own behaviors the cultural constructions derived from consensus analysis.

### **Results from Prior NSF Support**

The association of cultural consonance in two domains with adaptational outcomes was examined in previous research supported by the National Science Foundation (BNS-9020786), entitled "Social Environment and Physiologic Adaptation," carried out in Brazil. This two-year project with one year of unfunded extension was carried out between June, 1991 through May, 1994. The total amount of the award was \$80,000, with an additional \$20,000 in funding provided by The University of Alabama. Publications resulting from the research include Dressler (1996a); Dressler, Santos and Balieiro (1996); Dressler, Balieiro and Santos (1997); Dressler, Balieiro and Santos (1998); Dressler, Balieiro and Santos (1999); and, Dressler and Santos (2000). There are two additional manuscripts in submission. In Brazil we examined cultural consensus in two domains: a material lifestyle indicative of success in life, and seeking social support from others during times of distress. The culturally appropriate responses to a set of questions about each domain were derived using cultural consensus analysis with a small (n=20) set of key informants drawn from diverse socioeconomic groups. In analyzing these data using the cultural consensus model (using ANTHROPAC, Borgatti 1990), it was determined that there were shared cultural models of the successful lifestyle and of social support. Intracultural diversity in these cultural models was explicitly tested, and it was found that cultural consensus extended across the four diverse

socioeconomic groups. This was somewhat surprising given the socioeconomic diversity in Brazilian society (Dressler, Santos and Balieiro 1996).

Then, similar questions regarding lifestyles and social supports were used in a survey of 250 individuals. “Cultural consonance in lifestyle” and “cultural consonance in social support” were measured by calculating the similarity between an individual’s self-reports in the survey and the culturally appropriate responses derived from cultural consensus analysis with key informants. These measures of cultural consonance were then examined in association with measures of adaptational outcomes, including blood pressure and symptoms of depression. It was found that those individuals who most closely approximated the cultural model of each domain in their own reported behaviors also had the lowest blood pressure and reported fewest symptoms of depression. These associations were statistically independent of a large variety of covariates, including age, sex, obesity, diet (several different measures of nutrient intake), conventional measures of socioeconomic status, and psychological stressors (several different measures derived from the stress model). For example, the partial correlation of cultural consonance in lifestyle and systolic blood pressure is  $r = -.39$  ( $p < .001$ ); and, the partial correlation of cultural consonance in social support and blood pressure is  $r = -.25$  ( $p < .001$ ).

In addition to independent associations, the interaction of individual difference factors and cultural consonance were investigated. Significant interaction effects between cultural consonance in lifestyle and perceived stress (Dressler and Santos 2000), and between cultural consonance in lifestyle and skin color (Dressler et al. 1999) in relation to blood pressure, were discovered. Low cultural consonance increases the magnitude of the association between both perceived stress and blood pressure, and skin color and blood pressure; conversely these associations are moderated under conditions of high cultural consonance.

The magnitude of these associations, after controlling for relevant variables, is substantial. High cultural consonance in social support is associated with a mean systolic blood pressure almost 10 mm Hg lower than persons low in cultural consonance in social support. Darker-skinned Brazilians with higher cultural consonance in lifestyle (defined as +1s.d.) have mean systolic blood pressures 16 mm Hg lower than darker-skinned Brazilians with low (-1s.d.) cultural consonance in lifestyle; the corresponding difference for lighter-skinned Brazilians is 6 mm Hg. Low cultural consonance in social support is associated with an average systolic blood pressure almost 10 mm Hg higher than persons with high cultural consonance in social support, and with a 13% increase in depressive symptoms. Depending on the outcome examined, the cultural consonance variables account for between 4% and 14% unique variance in regression models. Also, Handwerker (2000) has independently replicated the cultural consonance model in a study of depression among women in the Northeastern United States. Finally, as Dressler and Bindon (2000) and Handwerker (2000) have shown, it is cultural consonance that is important in association with adaptational outcomes. Cultural competence in a particular domain per se was found to be unrelated to physiologic or psychological outcomes.

The overall results of previous research funded by NSF can be summarized as follows: The more closely individuals approximate *in their own behaviors* the shared expectations of local cultural models of these cultural domains, the better their physiological and psychological adaptation. These results suggest that at least a part of the association of social position and adaptational outcomes is mediated by the relative ability of individuals to act on the shared expectations of their culture regarding those positions. Additionally, cultural consonance moderates the association of individual social and psychological factors with individual adaptation. These associations are unaffected by adjusting for potential covariates (diet, body composition, and demographic variables).

### **Building Culture Theory: Extending and Elaborating the Model of Cultural Consonance**

There are three processes by which cultural consonance along various dimensions might be related to individual adaptation. First, cultural consonance along various dimensions might subsume all individual-difference variables that have been examined in relation to adaptation. This seems unlikely. Second, there may be particular dimensions of cultural consonance, such as lifestyle and social support, that have a direct and independent influence on individual adaptation. Evidence thus far is consistent with this possibility (i.e. the associations of cultural consonance and individual adaptation are independent of other potential correlates). Third, cultural consonance along specific dimensions may condition daily life by altering the meaning of individual appraisals. There is evidence that is also consistent with this possibility (i.e. level of cultural consonance in lifestyle alters the association of perceived stress with adaptation, and it alters the association of skin color with adaptation).

Of the latter two likely possibilities, the third seems a more interesting direction for research and theory building. The growth of the list of human factors that might influence individual adaptation at times seems endless. The development of models that can integrate factors, especially across levels of analysis, would be useful. As we have argued elsewhere (Dressler and Bindon 2000; Dressler and Santos 2000), cultural consonance along several dimensions creates a cultural space in which individuals lead their daily lives (“cultural space” in this sense is analogous to, but distinguishable from, Bourdieu’s (1984) concept of social space). This cultural space conditions the meaning of social interaction by virtue of the individual’s place in that space. For example, individuals high in cultural consonance along several dimensions may literally live in a world that appears more meaningful and predictable since they are leading a life consistent with cultural scripts. For individuals low in cultural consonance, life may appear less meaningful and predictable, which in turn may exacerbate the psychophysiologic effects of negative emotion, threatening appraisals, and negative social interaction. This is a reasonable interpretation of the findings that, for individuals who are low in cultural consonance, perceived stress and darker skin color are more strongly associated with adaptation than for individuals who are high in cultural consonance (Dressler, et al. 1999; Dressler and Santos 2000).

This orientation can be elaborated in two ways. First, it seems unlikely that the definition of individual cultural space can be exhausted by only two dimensions of cultural consonance (i.e. the successful lifestyle and social support). Other measures of cultural consonance need to be developed and tested. Second, it seems likely that there are particular kinds of individual-level stressors that are conditioned in their effects by one’s place in cultural space. In order to elaborate and build the theory of cultural consonance and individual adaptation, these two parts of the theory will be investigated more closely and precisely.

With respect to the shape of the cultural space defined by cultural consonance, more cultural dimensions need to be incorporated into the theory. The important cultural dimensions are likely to vary from one society to another, so ethnographic evidence is essential in this regard. Ethnographic data can be used to guide the selection of particular cultural domains that may define the relevant cultural space for that society. Symbolic/interpretive anthropologists writing about Brazil tend to emphasize a few themes in characterizing Brazilian culture. One of these is the hierarchical nature of social relationships. Hierarchy in Brazil is rarely overtly apparent in social interaction, but rather lies just beneath the surface and can be activated by the question “*you know whom you are talking to?*” (do you know whom you are talking to?) (DaMatta 1995). A second is the strong emphasis placed on kinship relationships, especially those formed by the linking of nuclear families through generations and collaterally (DaMatta 1985). The Brazilian emphasis in this regard could be termed “familism.” A third is captured by the elusive Portuguese term *jeito*, which basically refers to a Brazilian characteristic of adaptability and flexibility, especially in overcoming bureaucratic obstacles (Barbosa 1992). In other words, these themes describe a Brazilian cultural world in which hierarchy is rigid and oppressive, but in which the warm emotional bonds of the family provide a refuge, and the Brazilian *jeitinho* or “knack” provides some hope for circumventing what would otherwise be stumbling blocks (da Matta 1995).

The domains investigated thus far in Brazil—the successful lifestyle and social support—sample these themes partially, in terms of hierarchy and social relationships, but they probably do so incompletely. For example, our measure of cultural consonance in social support does not sufficiently elaborate the range of kin and nonkin social relationships that people can rely on, especially with respect to familial relationships. Similarly, in terms of achieving distinction in the social hierarchy, the items measuring cultural consonance in lifestyle are incomplete. This is not to say that these measures should be abandoned; rather, they should be expanded and augmented with a more complete sampling of these and other cultural domains.

One question that is central to the research, but that cannot be answered without more careful, focused ethnographic interviewing, is whether or not these cultural themes—hierarchy, familism, and adaptive flexibility—represent cultural domains in the strict sense (i.e. “...an organized set of...concepts...all on the same level of contrast, that jointly refer to a single conceptual sphere” (Weller and Romney 1988: 9). Although these are somewhat more diffuse concepts than cognitive anthropologists often investigate, it may be that these are analytic glosses for generally understood cultural domains in Brazil, and that sets of concepts referring to these domains can be elicited.

It may, however, turn out that these are themselves components of a higher-order cultural domain. That domain could be Brazilian national identity. Caulkins (Caulkins and Hyatt 1999; Caulkins 2000; Caulkins, et al. 2000) has examined just such a domain in the British Isles. Based on in-depth, open-ended interviewing, Caulkins and his associates identified key cultural themes regarding social behaviors and related values among British ethnic groups (e.g. Scots, Welsh, Irish and English). Then, these themes were used to develop “cultural scenarios,” which are concrete manifestations of those themes and values. An example of a scenario for the British ethnic groups describes a professor (high status) inviting workmen (low status) in for tea. Such scenarios are rated by informants on a 5-point scale of the “Welshness,” or of the “Englishness,” etc. of the behaviors. Two important findings have emerged. First, Caulkins has found cultural consensus within each group regarding the ethnic referents of the behaviors. Second, the groups can be reliably distinguished from one another on the basis of the cultural answer keys. The shared meanings of these social behaviors in the aggregate define culturally constructed national identities.

So, these may be separate domains (the successful lifestyle, social support, hierarchy in social relationships, familism and adaptive flexibility), or they may represent components of a higher-order cultural domain of Brazilian identity. In-depth interviewing and participant-observation will help to identify how people talk about these cultural domains in everyday language. Beyond open-ended interviewing, however, two approaches can be taken. First, specific models for each domain can be elicited and constructed, once context-specific terms for the domains have been identified. These will then be tested using cultural consensus analysis. Second, Caulkins’ (2000) technique of cultural scenarios can be employed, building in scenarios that refer to the cultural themes. It is possible, or even likely, that cultural consensus will be achieved at both the more domain-specific level of analysis and at the more general Brazilian-identity level of analysis.

Items will then be developed for survey research based on this process of cultural modeling. Self-report scales of behavior and belief will be developed that will be used to assess how well individuals in their own behavior approximate shared cultural knowledge. Since it is likely that cultural consensus will be obtained on both specific domains (as we have already found) and on the more general level of identity (as Caulkins found), items at both levels of contrast will be developed. Then, measures of cultural consonance in each specific domain, as well as at the level of national identity, will be developed and examined in relation to individual adaptation. Specifically, the interactions between individual difference psychological variables and the various measures of cultural consonance will be examined.

There are two general issues in this proposed research that can only be adequately addressed by doing the research. First, this research is somewhat of a departure from work often done in the tradition of cognitive anthropology, primarily because we are examining cultural domains not as subjects of study in and of themselves, but rather with the aim of understanding how cultural consonance with cultural domains influences individual adaptation. Therefore, the domains proposed for study here are not necessarily easily studied cultural domains, but rather are of potential importance for the investigation of psychophysiological outcomes. DaMatta (1991) notes that his Brazilian informants were often reluctant to discuss rituals of social interaction that overtly introduced implicit beliefs about social hierarchy. In other words, the investigation of these domains may be difficult. Nevertheless, these appear to be the domains best suited to understanding individual adaptation. Second, while intracultural diversity in cultural consensus was tested for and not observed in the first study, there is still the possibility that substantial intracultural diversity will be observed, either in new cultural domains studied, or in cultural domains studied more precisely. If this is the case, how is cultural consonance to be measured? The orientation that will guide us in this respect is political-economic (Goodman and Leatherman 1998). It seems likely that the cultural representations of the economically dominant class in Brazil will be those that are most highly valued; therefore, cultural consonance will be measured, in that event, as the degree to which individuals approximate in their own behaviors the cultural model of the highest socioeconomic group in the research (a description of this group is provided below). Again, however, this is an issue that can only be examined by actually doing the research.

### **Individual Difference Variables**

The model proposed here is that specific individual-level psychological stressors will be exacerbated in their effects for individuals who are low in cultural consonance. As suggested above, low cultural consonance may create a context of unpredictability and anomie for individuals, that in turn exacerbates the psychological experience of that sense. Therefore, the measurement of individual difference variables should focus on variables that assess those dimensions. A scale used previously in Brazil, Cohen's Perceived Stress Scale (Cohen et al. 1983) is appropriate in this regard. This scale emphasizes the extent to which individuals perceive their lives as under control and predictable, and, as shown previously, is associated with adaptational outcomes in Brazil in interaction with cultural consonance. The assessment of stressful life events can be helpful in this regard, especially so-called "negative" or "exit" events. The occurrence of these culturally disvalued events can be interpreted as subtracting from an individual's social identity (Tausig 1982; Dressler 1991), and therefore fits with the attempt to assess how people low in cultural consonance may be affected more by factors that may reinforce a sense of cultural marginalization. Finally, as we have argued elsewhere (Dressler and Santos 2000), persons low in cultural consonance, already experiencing a kind of cultural marginalization, may be particularly sensitive to negative social interactions, ones in which they see themselves as perhaps demeaned or disrespected. Handwerker (2000) has recently developed a scale that assesses precisely this dimension of stressful social interactions, and it will be incorporated into the research. This battery of stressor measures should provide an appropriate test of the model.

### **Alternate Explanatory Variables**

The dietary correlates of physiologic and metabolic measures of adaptation are well known, and these will be the primary control variables in this study. These include for blood pressure: sodium intake; potassium intake; the ratio of sodium to potassium in the diet; alcohol intake; and, calcium intake. For serum lipids the following variables have been investigated: dietary fat, including total fat, saturated fat, polyunsaturated fat, monounsaturated fat, and various ratios of fat types; cholesterol intake; and, a variety of formulas that link caloric intake, fat intake, and cholesterol intake. As we have shown elsewhere (Santos, Dressler and Viteri 1994), given the variability of dietary behaviors in the Brazilian population, it

is possible to detect the association between dietary intake and adaptational outcomes in a general population sample. Measures of nutrient intake will be included in the analysis, along with related measures of body composition.

### **The Current Proposal: Research Aims and Hypotheses**

The aim of the current proposal is to extend and expand upon findings from previous research in Ribeirão Preto. Specifically, the aims of the research are to: (1) refine the conceptualization and measurement of cultural consonance; and, (2) examine specific interactions between cultural consonance and psychological factors as correlates of individual adaptation.

#### (1) Conceptual/methodological development:

- As noted above, new cultural domains will be investigated, including hierarchy in social relationships, familism, adaptive flexibility, Brazilian national identity and an expanded conceptualization of the successful lifestyle and social support. Initial effort in the proposed research will involve open-ended interviewing and elicitation tasks to examine these cultural domains.
- Systematic data will be collected in these cultural domains from a set of key informants. These data will be used in cultural consensus analyses of each of these domains.
- It is anticipated that consensus on the domains of the successful lifestyle and of social support will be replicated. It is also anticipated that consensus in the domains of hierarchy in social relationships, familism, and adaptive flexibility will be obtained, as well as in the more general domain of Brazilian national identity.

#### (2) Extension of previous findings:

- In survey data, cultural consonance with each of the domains discussed will be calculated. It is predicted that higher cultural consonance in each of these domains will be associated with enhanced individual adaptation (i.e. lower blood pressure, a lower ratio of total cholesterol to high density lipoprotein cholesterol, lower apolipoprotein B enzyme, and fewer reported symptoms of anxiety and depression), adjusting for appropriate covariates (diet, body mass and demographic variables).
- In survey data, it is predicted that individual psychological variables (including perceived stress, stressful life events, and stressful social interactions) will be associated with individual adaptation in interaction with cultural consonance, adjusting for appropriate covariates (diet, body mass, and demographic variables).
- It seems unlikely that all measures of cultural consonance will moderate in the same way the individual psychological variables; however, at this point no specific predictions can be made regarding which measures of cultural consonance will prove important. (Note that the number of interactions to be tested is not likely to lead to the identification of positive results on a purely chance basis.)

### **The Research Setting**

This research will be conducted in the city of Ribeirão Preto, a city of approximately 500,000 population in the state of São Paulo. Ribeirão Preto sits in the middle of the richest agricultural region in Brazil. Much of the land surrounding the city is devoted to the cultivation of sugar cane, which in turn is refined into sugar and used in the production of alcohol fuel for automobiles. Significant amounts of land are also devoted to the cultivation of coffee and citrus. The city was founded in the late nineteenth century as a market center for the large farms (*fazendas*) in the region. Later, it became important as a rail center, and for light manufacturing such as the brewing of beer. The city grew dramatically in the years

following the second world war as a financial service center and a regional center for health care. Today it is among the most affluent cities in Brazil.

One of the challenges of this research will be to adequately sample the full range of socioeconomic variation in the city. The sampling strategy employed in prior research will be selected again (see below). In previous research (Dressler 1996a; Dressler et al. 1996; 1997; 1998; 1999) we first identified four neighborhoods in the city that spanned that socioeconomic range. Households were then sampled within those neighborhoods for more intensive study. The poorest neighborhood was a *favela* on the edge of the city. *Favelas* are semi-legal squatter settlements made up both of migrants seeking to partake of the affluence of the region, and of the socially marginal who have not been able to attain economic stability. They are semi-legal in the sense that the building of houses on the site has not been approved by the municipality, but the residents nevertheless pay rent on the house sites to the owner of the land. In fact, upon leaving the *favela*, residents will even sell their houses to new arrivals. Houses in a *favela* vary enormously, ranging from ragtag affairs hammered together from castoff lumber and corrugated tin, to concrete block and multi-roomed houses with electricity siphoned from a passing power line. People in the *favela* tend to be unstably employed as unskilled laborers and domestics.

The second neighborhood sampled was a *conjunto habitacional*. A *conjunto* is a kind of public housing project. In partnership with the local city government, a builder will develop houses on a tract of land on the edge of the city; the *conjunto* studied here was begun in about 1988 and consisted of several hundred 3-4 room concrete houses. The houses are then sold to buyers who qualify for low-cost loans on the basis of being stably employed. Persons in the *conjunto* tend to be employed in semi-skilled jobs such as driving a bus or in construction or low-status service jobs. The key, however, is the stability of the employment. A *conjunto* passes from nondescript sameness to variation in housing styles very quickly, as people add rooms (sometimes stories), garden walls, garages, and architectural details to their basic houses. As the *conjunto* evolves, more basic services are added, such as small grocery stores, drug stores, and other shops. In this way, the *conjunto* takes on the feeling of a small independent community attached to the larger city.

The third neighborhood sampled was a traditionally lower middle class area of the city. Early in the century this was a new neighborhood created by the influx of Italian and Spanish immigrants to Ribeirão Preto; now it is an old neighborhood completely engulfed by the city proper. The streets are cobbled (rather than paved) and the houses present seamless walls to the street. There is a large *praça* or square with a church in the center of the neighborhood, and many shops, bars, and restaurants. In short, this neighborhood has a much more urban feel to it, although it is not in the city center proper. Houses here are substantially larger than in a *conjunto*, and although the economic participation of residents tends to be quite varied, incomes and occupational statuses are substantially higher. People tend to be in business, or to work as lower level managers in factories or the public sector.

The fourth and last neighborhood studied is an upper middle class area made up primarily of recently constructed houses. The residents are upper level managers, prosperous businesspersons, and professionals. This happens to be an attractive neighborhood for physicians and related professionals, some of whom have studied and taken graduate and postgraduate degrees in the United States and Europe. The houses verge on being enormous with extensive and well-tended gardens.

Two major economic events have occurred in the past five years that will have direct implications for this research. The first, or *real* plan, was a currency stabilization plan developed by the current president of Brazil, Fernando Henrique Cardoso, prior to his election, and then continued under his two terms as president. The *real* plan involved the strict regulation of the exchange rate by the Brazilian government and, more importantly, the protection of the currency. This meant that for about four years the currency (the *real*) maintained a 1:1 relationship with the U.S. dollar. This, coupled with some other economic

innovations (such as the MERCOSUL common market), resulted in measurable economic change within the Brazilian population. According to figures from the *Pesquisa Nacional por Amostra de Domicílios* (National Household Survey) of the *Instituto Brasileiro de Geografia e Estatística* (Brazilian Institute of Geography and Statistics), Brazilian households earning less than three minimum salaries per month (a measure of the poverty line) declined by 18.4% between 1992 and 1996, a result of increased employment in the private sector stimulated by the strong currency. Also, because hyperinflation was tamed by this plan, Brazilians went on an unprecedented buying spree, with households that formerly were without basic elements of the cultural model of lifestyle such as a refrigerator or mass-produced furniture purchasing those and similar items.

The second important event was the *choque* (shock) or *golpe* (blow) that occurred in the economy late in 1998 and early in 1999, resulting from capital flight following the Asian economic crisis. Although severe hardship seems to have been avoided by international intervention, Brazil is no longer able to protect its currency. Already the *real* has lost 100% of its value against the dollar. This means that the opportunities for lifestyle change enjoyed over approximately four years are rapidly eroding, and with stringent controls placed on governmental spending by international agencies, the lower class will be fortunate if they can hold the economic ground they have gained.

These changes over the past five years afford us the opportunity to study directly the cultural effects of economic change. Was this period of prosperity sufficient to change the cultural model of the successful lifestyle? Did this period of economic growth have any effect on the cultural model of social support? How was diet influenced? Will any changes observed in cultural models and diet have any effect on individual psychobiological adaptation?

## **Research Methods**

Sampling: Two kinds of sampling will take place. In the first, key informants will be sampled from each of the four neighborhoods to obtain data for cultural modeling. In the second, a survey sample will be selected for purposes of collecting data on cultural consonance, diet, and adaptational outcomes. For sampling key informants, a similar strategy will be followed as we used in previous research (Dressler et al. 1996). Handwerker and Wozniak (1997) have demonstrated that purposive sampling of key informants is an efficient strategy when the aim is to examine cultural models. Key informants who are generally representative of families in each neighborhood will be selected by research assistants familiar with each neighborhood. For initial open-ended interviewing (see below), a minimum of five key informants will be selected from each area. Note that this will result in a total of 20 open-ended interviews overall. There is little guidance in the ethnographic methods literature regarding the number of key informants adequate for identifying cultural domains and for eliciting terms associated with domains. The estimate of 20 informants is based on our previous research in Brazil and on the number of informants employed in published research. This seems an adequate number for sampling the range of variability in cultural domains. For obtaining more structured data for cultural consensus analysis (see below), ten informants will be selected from each neighborhood (for a total of 40 informants). This estimate is based on our prior experience with the technique, our estimates of the level of cultural consensus predicted, and the power estimates available in Romney et al. (1986).

The same sampling strategy will be used for survey sampling in the current project that was employed in the previous research described above. We will return to the same four neighborhoods that were studied in 1991-94. There is, however, one difference. Toward the end of the previous study, an activist municipal government embarked on a campaign to eradicate *favelas* in Ribeirão Preto. To do so the municipality developed a modified *conjunto* plan in which extremely modest neighborhoods of cinderblock houses (two rooms plus a bathroom) were built on the edge of the city, with all houses having sewer and water. The residents of the *favela* we sampled in the previous study were then, in essence,

removed to this new neighborhood by virtue of their *favela* being razed. Instead of purchasing these homes, as would be the case in a *conjunto habitacional*, the residents pay rent for their new homes. We have maintained contact with members of the new “*favela concreta*” (as some people ruefully referred to the neighborhood) over the intervening years, and informants estimate that about 50% of the original population of the *favela* have remained in their new homes (the remainder having left and started a new *favela*). Although the new housing is at least marginally better for most of this neighborhood, the conditions of daily life have not changed substantially for the population. Therefore, in order to maximize the comparison with the previous study, the *favela concreta* will serve as the lowest socioeconomic neighborhood to be sampled.

The four neighborhoods to be sampled are as follows:

- The *favela concreta*
- The *conjunto habitacional* (José Sampaio)
- The traditionally middle-class neighborhood (Vila Tibério)
- The upper middle-class neighborhood (Jardin Recreio).

Because city services are established in the *favela concreta*, city maps indicating occupied addresses can be used in each of the neighborhoods for sampling. Households will be randomly selected from each neighborhood. In previous research both the household head and spouse, and one child older than 18 years of age, were invited to participate in the study. Aiming for a sample of 40 households from each neighborhood resulted in about 75 individuals from each group, for a final sample size of 304. Given the effect sizes obtained in prior research, this provided ample statistical power. Therefore, the same sampling strategy will be followed in the research proposed here. Fifty-five households will be randomly selected from each neighborhood which, with an anticipated response rate of about 70%, will result in a total sample of about 300 persons. [Based on effect sizes from the prior research, a statistical power of .80 (the minimum recommended power) could be achieved for cultural consonance in lifestyle with a sample size of 130, and for cultural consonance in social support with a sample size of 200. Therefore, the projected sample size will exceed required power levels. Note that these power estimates are derived from a power analysis of the amount of variance explained in a regression analysis with an appropriate number of covariates.] It should be noted that we are seeking here an unbiased sample of respondents that maximizes the sociocultural contrasts within the Brazilian population. This sampling strategy is a proven mechanism for obtaining such a sample.

Protection of human subjects: Sampled households will be invited to participate in the research. At that point, prior to the collection of the sociocultural data, a statement of informed consent will be read to potential respondents. They will be informed of the purpose of the study, and of the strict confidentiality of the data they provide. Potential respondents will have all procedures explained to them at that point, including the sociocultural interview, the dietary recall interviews, and the biomedical examination, which will include a fasting venipuncture. They will be assured that they have the right to withdraw from the study at any time, and to refuse to answer any questions without prejudice. They will be assured of the routine nature of the venipuncture, and that it is highly unlikely that any problem could occur with it, but that if one did the nurse conducting the examination would be able to respond immediately. They will be assured that they will be provided any information they wish (e.g. blood pressure or lipid values) upon completion of the research. After the research assistant has determined that they understand fully the procedures involved, their verbal agreement to participate in the research will be taken as evidence of informed consent.

Measurement of cultural consonance: The measurement of cultural consonance will be a three-stage process. The first stage will involve open-ended key informant interviewing on the topics of lifestyles,

social support, hierarchy in social relationships, familism, and adaptive flexibility (*jeito*) in Brazilian life. These interviews will be oriented toward a discussion of common social interactions and individual aspirations in which discussion of these domains might emerge. Special emphasis in these interviews will be placed on eliciting life history narratives that, when compared across informants, can generate common themes. A major thrust of this interviewing will be to determine if these represent separate domains, or if they are better understood as components of a more general domain of Brazilian identity. The open-ended interviews will be tape recorded and transcribed for more intensive qualitative analysis.

In addition to the open-ended narratives, free-listing and sorting tasks (as described by Weller and Romney 1988) will be employed to more precisely derive items for subsequent analyses. The use of free-listing and sorting tasks will be facilitated by the analysis of the narrative interviews, because the narrative interviews will provide the precise terminology that can be used for eliciting the terms and concepts that make up the domain. For example, people will be asked to list all the different persons they might ask for help in response to a common stressor, as a way of elaborating the model of social support. Similarly, people will be asked to list all the situations in which they can imagine someone asking for a *jeitinho* as a way of circumventing bureaucratic or other obstacles. For hierarchy in social relationships, informants might be asked to list the situations in which some people try to act superior to other people. These of course are only examples that will be made more concrete on the basis of the analysis of the narratives.

In the second stage of the measurement process, informants will be interviewed using a structured instrument based on the first stage. The interviews for lifestyles and social supports will be modeled on interviews previously used, in which informants will be asked to rate the importance of lifestyle items, or, in the case of social supports, the importance of potential sources of social support. For concepts of hierarchy in social life, familism, and adaptive flexibility, items will be developed that are most appropriate for the expression of the concepts emergent in the interview data. For the concept of Brazilian identity, a series of vignettes will be developed that describe individual actions in mundane social situations. Informants will then be asked to rate how “Brazilian” an individual’s behavior is. It is important to note that in these tasks, informants will not be asked to describe their own behaviors, but rather to describe what they believe is typical for their community. An example of such a vignette would be: “A person who is applying for a driver’s license has forgotten one piece of paperwork. Rather than wait until another day, he asks the clerk for a *jeitinho*, to ignore the missing paperwork and issue the license anyway. How Brazilian is this?” The behavior would then be rated on a 4-point scale from “not at all” to “very” Brazilian (4-point scales can be readily used with illiterate informants.) These data will then be used for cultural consensus analysis.

In the third stage of the measurement process, questions similar to those used in the consensus analysis, but framed in such a way that individuals are described their own behavior, will be developed for inclusion in the survey portion of the research. Then, cultural consonance in each cultural domain can be calculated as the degree to which individuals approximate in their own behavior the prototypical behaviors described in the cultural consensus models. As noted above, if there is substantial intracultural diversity detected in any cultural domain, a political-economic orientation will be used to guide measurement, and cultural consonance will be measured as the degree of approximation to the cultural models of the socioeconomically dominant class.

Measurement of social-psychological variables: The main social-psychological variables to be assessed for hypothesis testing include: Cohen’s Perceived Stress Scale (Cohen, et al. 1983); a truncated measure of stressful life events, emphasizing negative or exit events (Tausig 1982); and, an adaptation of Handwerker’s scale of negative social interaction (Handwerker 2000). The 14-item Perceived Stress Scale has been translated into Portuguese, shows acceptable reliability ( $\alpha = .80$ ), and was found to be associated with adaptational outcomes in a previous study in Brazil (Dressler, et al. 1997). Inventories of

stressful life events, including the inventory of negative events or exits to be used here, have been developed for Brazil and will be adapted from existing instruments (Lipp 1996). Handwerker's (2000) scale will be translated into Portuguese, pre-tested, and adapted for this research.

Measurement of dietary variables: The same methods successfully used in two previous studies in Ribeirão Preto to assess dietary intake will be employed (Santos et al. 1994). This involves doing two 24-hour dietary recalls with each respondent. Because of the atypical amount and quality of food consumed on Sundays, one 24-hour recall is always done on a Monday. The second is done indifferently on other days of the week. All dietary recall interviews will be conducted by trained nutritionists using standard methods. The quantities of food consumed are then converted to nutrient intake using a computerized food table developed specifically for Brazilian foods by the University of São Paulo. This will provide estimates of the intake of total calories, protein, fat, sodium, and other nutrients for each individual in the survey sample.

Measurement of covariates: The major covariates to be included in this analysis include: age, sex, body mass index, and a set of sociodemographic control variables. The assessment of age and sex are unproblematic. Body mass index will be calculated from weight and height obtained at the final assessment (see below); weight will be obtained using a clinical balance beam scale accurate to  $\pm 1.0\%$  and height will be assessed using the attached fixed scale. Occupational class will be coded from occupational titles reported by respondents and ranked according to a scale that was developed for Brazil. Education will be coded as years of education. Total income for the household and income of the household head will be coded as number of minimum salaries (currently one minimum salary is equal to about US\$130.00).

Measurement of outcomes: Arterial blood pressure will be measured with an automated system, the DINAMAP Vital Signs Monitor Model 845XT. This automatic measurement reduces the error due to intra-individual variability and virtually eliminates the variability between observers. The mean of five readings taken sequentially every two minutes will be used as one outcome variable. The readings will be taken after the respondent has rested for ten minutes. All measurements will be taken with the arm supported at heart level.

A fasting blood sample will be obtained from each respondent. These blood samples will be used to obtain data on serum lipids. Serum lipid data will be used as another measure of individual adaptation. Total cholesterol (TC), high density lipoprotein cholesterol (HDL-C), and triglycerides (TG) will be measured using the automated Technicon Autoanalyser II. The determination of HDL-C will use dextran sulfate as the precipitating agent for the very low density and low density cholesterol fractions. The enzyme apolipoprotein B will also be determined.

Psychological distress will serve as another measure of individual adaptation. This will be measured using a symptom scale that includes symptoms of both anxiety and depression that was developed at the Federal University of Bahia in Salvador (de Almeida Filho 1987). This scale demonstrates acceptable reliability. [Note: The sequence of data collection is described below; see the budget justification for a precise description of personnel.]

Data analysis: The analysis of these data will proceed in three stages. In the first stage, qualitative data from the first round of interviews will be content analyzed to determine the specific cultural domains to be employed in the subsequent analyses. In this round of interviews sets of terms will also be elicited for subsequent cultural consensus analysis.

In the second stage, data from key informant interviews will be analyzed to determine cultural consensus in the cultural domains studied. Data will be analyzed to determine if there is a single shared cultural

model for each domain that spans the four neighborhoods. Then, intracultural diversity will be examined in two ways. Data will be analyzed specifically by neighborhood to determine if there are separate models for each domain specific to each neighborhood. These data will be analyzed using the cultural consensus analysis routine in ANTHROPAC (Borgatti 1993). These data will also be analyzed using the more general principal components model recommended by Handwerker (n.d.). In this approach the loadings of the first two principal components extracted from a correlation matrix of informants are plotted. A single cluster of informants in this plot indicates a single, shared cultural model. The extent to which individuals or a group of informants diverges from this cluster is indicative of alternative or competing cultural models. The results of these analyses will be used in formatting the final version of the survey interview schedule, and will be used as the target cultural models in calculating cultural consonance.

The third stage of the data analysis will follow the collection of the survey data. Initial data analyses at this stage will focus on the development of measures of cultural consonance in the domains of the successful lifestyle, social support, hierarchy in social life, familism, adaptive flexibility, and Brazilian identity. Additional scaling analyses will focus on the internal consistency reliability of the social-psychological scales included in the study. Then, the major hypotheses outlined previously will be tested, using hierarchical multiple regression analysis (Glantz and Slinker 1990). The general plan of these analyses, as they have been used in previous studies, will be to enter sets of variables in steps. For example, when analyzing blood pressure, the standard covariates of age, sex and the body mass index will be entered first. Then, cultural consonance variables and social-psychological variables will be entered to control for what, in regression analysis jargon, are called “main effects.” The interaction effects between cultural consonance variables and social-psychological variables, calculated as cross-products, will be entered (singly, and in combination, depending on the precise hypothesis). Finally, sets of alternative explanatory variables (including diet, genotype, and other social-psychological variables) will be entered as separate sets, to determine if any of these can reduce the association between cultural consonance (in any of the domains) and blood pressure. Therefore, each hypothesis will be tested with several analyses. Final models will be developed using those variables that have statistically significant associations with the outcome variable being examined.

Sequence of data collection and research timetable: The sequence and timing of data collection appears somewhat complex, although it actually is quite straightforward. The data collection will follow the same schedule as used in the previous study, except that there will be a longer period of initial ethnographic data collection. During the survey component of the research, data collection will require four separate interviews with each respondent. The sequence and timetable are as follows:

*Data collection sequence:*

1. Structured ethnographic data collection
  - Open-ended interviewing
  - Free-listing tasks
  - Pile-sorts and ratings
  - Cultural consensus analysis
2. Survey – *favela concreta*
  - Sociocultural interview
  - 1<sup>st</sup> 24-hr. recall
  - 2<sup>nd</sup> 24-hr. recall
  - Collection of biological data
3. Survey – *conjunto habitacional*
  - Sociocultural interview
  - 1<sup>st</sup> 24-hr. recall

*Research timetable:*

1. June 1 – Sept. 30, 2001
2. Oct. 1, 2001 – Feb. 28, 2002
3. March 1, 2002 – July 31, 2002

- 2<sup>nd</sup> 24-hr. recall
  - Collection of biological data
4. Survey – Vila Tiberio 4. Aug. 1, 2002- Dec. 31, 2002
- Sociocultural interview
  - 1<sup>st</sup> 24-hr. recall
  - 2<sup>nd</sup> 24-hr. recall
  - Collection of biological data
5. Survey – Jardim Recreio 5. Jan. 1, 2003 – May 31, 2003
- Sociocultural interview
  - 1<sup>st</sup> 24-hr. recall
  - 2<sup>nd</sup> 24-hr. recall
  - Collection of biological data
6. Data analysis 6. June 1, 2003 – Nov. 30, 2003

### **Significance of the Research**

The results of this research will contribute to the field of anthropology in three areas: culture theory; the developing biocultural synthesis; and research methods. The theoretical power of cognitive conceptualizations of culture as distributed cultural models is increasingly evident. Among the many advantages of such a concept of culture is the ability of the theoretical orientation to integrate a view of culture as (nonmysteriously) external to the group characterized by that culture, with a view of culture as distributed among real living people. Similarly, this view of culture can reconcile cultural constructionism and biological realism. The current research, building on our previous work, adds another crucial dimension: the realization of the cultural in individual behavior. Previous research is consistent with the view that individuals can be shown to be distributed, in terms of their behaviors, around a cultural central tendency that consists of a shared cultural model of some cultural domain. We have referred to an individual's approximation to these cultural models as cultural consonance. So far this theoretical construct has proven to be empirically useful. This research will provide an opportunity to explore this theoretical construct more fully.

The interest in understanding the intersection of biology and culture has waxed and waned in anthropology. There appears now to be a resurgence of interest in the field in understanding how culture and biology are connected. One challenge to achieving this synthesis continues to be incorporating a theoretically satisfying and operationally useful concept of culture in research that incorporates biologically sophisticated measures. The theoretical orientation of cultural models, augmented by the theoretical construct of cultural consonance, holds the promise for developing a truly *biocultural* synthesis (as opposed to understanding the social distribution of biological variables). Finally, anthropology has always faced the methodological challenge of translating a powerful theoretical orientation emphasizing cultural meaning systems into a framework for the collection of data that can be used to rigorously evaluate theoretical statements. A recurring theme in anthropology is the call for the integration of qualitative and quantitative methods as a way of achieving this. The theoretical orientation of cultural models, coupled with newer techniques in systematic data collection and cultural modeling, holds out the promise of a qualitative-quantitative integration that goes beyond merely using both sets of data-collection techniques in a single design. The cultural consensus model and related techniques of data collection and analysis truly represent a point at which qualitative research, with its emphasis on context and meaning, and quantitative research, with its emphasis on the distributive reliability of observations, merge. A research design incorporating ethnography, cultural modeling, and survey research offers the investigator a continuum of techniques (as opposed the dichotomy of qualitative versus quantitative methods). This research will contribute to that ongoing development.

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