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## Intelligence as Ecological and Cultural Adaptation

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### Introduction. What Is Intelligence?

This chapter begins by considering the notion of “intelligence” as situated within ecological and cultural contexts, and then presents an *ecocultural framework* that links these contextual variables to the development and display of individual behaviors. The second part of the chapter illustrates these variables and relationships among them with empirical research in two domains: indigenous cognition and cognitive style. It ends with a consideration of the implications of these conceptualizations and empirical findings for the present and future of human life in the Anthropocene Era.

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In my view, there is a need to understand the concept of “intelligence” in the contexts within which it develops and is expressed. My first articulations of this view were in two papers in the early 1970s. These were titled “Radical cultural relativism and the concept of intelligence” and “Differentiation across cultures: Cognitive style and affective style”. In the first, I proposed that we should “wipe the slate clean, and search for the possibility of qualitatively different ‘intelligences’, developing in differing cultural contexts” (1972, p. 79). In the second paper, I proposed that the cognitive aspects of human functioning (captured by the notion of “cognitive style”) needed to be supplemented by the socio-emotional aspects (captured by the notion of “affective style”, p. 170).

In both papers, I argued that the “ecological demands” for living successfully in a particular habitat, and the “cultural aids” that promote adaptive behavioral development, needed to be studied and understood before any conceptualization or assessment of individual behavior (especially “intelligence”) could be undertaken. An analysis of these ecological and cultural features of the context within which a population lives is first carried out using ethnographic methods and then serves as a basis for the conceptualization and assessment of the behaviors with psychological methods that permit survival across and within generations.

In my first studies, these cognitive and social features were identified during fieldwork, which was carried out in the 1960s in Sierra Leone and the Canadian Arctic (Berry, 1966, 1967). Initially, they were considered to be discrete behaviors that are adaptive to specific local demands. Later, it became apparent that they were not discrete, but rather they formed a pattern of behaviors (Berry, 1983), one that had an affinity with the concept of *psychological differentiation* developed by Witkin et al. (1962; Witkin & Berry, 1975). These behaviors and the patterns that they make may be seen as precursors to the later interests in cross-cultural psychology in the dimensions that contrast the analytic/holistic thinking, individualism/collectivism, and the independent/interdependent ways that people deal with their physical and social worlds (e.g., Berry, 1994; Markus & Kitayama, 1991; Triandis, 1995).

These two early papers contain the core of my ideas on human intelligence: It is a set of cognitive and social capacities and abilities that are adaptive to context; they are organized into patterns that serve societies

over time and individuals during their lifetimes, in their attempts to live successfully. This view has become widely accepted in the literature (e.g., Sternberg, 2019). These contexts are the local ecological and cultural habitat, which are both constantly changing; they are also the external influences from contact with other cultures that bring about further changes and challenges. My *ecocultural* perspective on human behavior has evolved from these core ideas (Berry, 1975, 1976, 1980, 1983, 1987, 1994, 1995, 2004, 2018).

All concepts have cultural roots, including the concept of *intelligence* (Sternberg, 2007). The concept of culture is used to describe the characteristic features of a society that are acquired and shared by its individual members; what do they have in common, and what distinguishes them from other societies? These features can be material (such as technology and physical structures), social (such as political and economic institutions), and symbolic (such as values, myths, and religious beliefs). These shared features of the population provide the basis for other common aspects, such as their goals and their motivations to achieve them. The concept of “intelligence” is just one feature of these shared cultural values and goals. It incorporates the important qualities (the underlying processes and overt behaviors) that are considered to be essential for survival and are to be inculcated in individuals and to be developed widely in the population.

Both individuals and groups are needed for the survival of the human species: individuals cannot survive alone; nor can groups survive without individuals procreating. Given this joint requirement, Aberle et al. (1950) have proposed nine functional prerequisites of society that are required to maintain and operate a successful society, and hence their survival as a group, and as individuals. One of these nine functions is having a “shared cognitive orientation”, which comprises the multiplicity of cognitive capacities (abilities) that are essential for societal survival. Two other functions are fundamentally social: the need for socialization into the society and the regulation of affective expression among members. Together, these functional prerequisites serve as a foundation for the cognitive and social development of individual members.

The field of cross-cultural psychology (e.g., Berry et al., 2011) considers that all human behaviors are shaped by the cultural contexts in which

they have developed and are expressed in daily life. That is, individual behaviors are viewed as long-term adaptations to living in a culture through the processes of development and enculturation. One background to this basic principle of individual adaptation to cultural context is that cultures are themselves situated in broader *ecological* contexts; features of cultures are fundamentally shaped by the supporting and constraining features of the physical habitat in which they have evolved. In addition, the new *sociopolitical* contexts are introduced by contact with other cultures. That is, cultural features of the society, as well as individual behaviors, are considered to be attempts to improve the “fit” among individuals, societies, and their habitats. This sequence of adaptations is at the core of my ecocultural perspective (Berry, 2018).

This ecocultural perspective is based on two principles: (i) psychological processes are *universal*, and they are shared by all cultural populations, and (ii) these processes become variably developed and expressed in behaviors during the process of *adaptation* over time (historically) and during the individual’s lifetime (ontogenetically). This perspective applies to intelligence as much as to any other feature of human psychology.

The principle of universal psychological processes is rooted in our shared biology; all human beings have common life systems made up of our physical structure, physiology, and neural and hormonal functions. These functions provide the basis for operating all our domains of behaviors: sensation, perception, cognition, emotions, personality, motivations, and social actions. Without these underlying commonalities, we could not interact effectively among individuals within societies, or across groups between societies. Equally important is that, without these commonalities, comparison across individuals, groups, and cultures would not be possible, since the act of comparison requires some underlying similarity.

The second principle is rooted in the existence of the obvious surface variations in behaviors among individuals in any population; this behavioral variation may be viewed as a set of adaptations to ecological and cultural context. If such behavioral variation can be linked systematically to variations in life conditions and experiences of individuals, then it is possible to conclude that such behavioral variation is the consequence of the need to develop the capacities that are required to survive and thrive in these habitats.

I conclude that intelligence is the complex *cognitive and social capacity to adapt successfully to life conditions*, including those that have been experienced during the course of development, and to the changing conditions that are now being experienced. Since these conditions vary widely, a cultural group's conception of what intelligence is, and a person's own developed intelligence, will also vary widely.

## Differences from the Conventional View of Intelligence

As described above, my view is that "intelligence" is highly variable across cultures and individuals, rather than being a single quality. It is certainly not something that has been conceptualized or assessed adequately by psychologists in any single society. It varies by ecological context, by cultural group, and by individuals; only the last feature (individual differences) has some correspondence with the conventional view of intelligence. To explicate these ecological and cultural variations, I now turn to a summary of the ecocultural perspective on the development and display of behavior.

### Ecocultural Perspective

As noted above, the ecocultural perspective considers that all group and individual features of human populations can only be understood when viewed as being situated in their contexts. In the first step, the *ecological* approach examines phenomena in their natural contexts (habitats) and attempts to identify relationships between cultural and behavioral phenomena and these ecological contexts. In the second step, the *cultural* approach examines individual behaviors in the cultural contexts in which they develop and are displayed. When these examinations are carried out comparatively, the *cross-cultural* approach is the third step. Essential to understanding all these steps are the concepts of *interaction* and *adaptation*. Interaction implies reciprocal relationships among elements in the system; adaptation implies that changes take place that may (or may not) increase their mutual fit or compatibility within the system.

In addition to this ecology → culture → behavior line of thinking, another line in the ecocultural framework originates from contact with other cultures. This second external source of influence links the *sociopolitical* context that brings about contact with other cultures, which in turn shapes both the original ecological and cultural features of the group and then the behavior of individuals in the group. In this case, there are both interactions among peoples of diverse cultural backgrounds and mutual adaptations to intercultural contact. This second line of research examines the impact on cultures and individuals from contact with outside cultures; it has been advancing greatly in recent years (Sam & Berry, 2016). This impact includes new challenges that may modify and extend the way intelligence is conceived, developed, and expressed.

By combining the ecological and sociopolitical sources of influence on how groups and individuals develop, interact, and adapt to change, the ecocultural approach to understanding human behavior is generated. Its core claims are that cultural and biological features of human populations interact with, and are adaptive to, both the ecological and sociopolitical contexts in which they develop and live, and that the development and display of individual human behavior are adaptive to these contexts.

To operationalize this ecocultural perspective, an ecocultural research framework was developed, starting in the 1960s (Berry, 1966). This framework has evolved through a series of conceptual elaborations and empirical studies devoted to understanding similarities and differences in perceptual as well as cognitive and social behaviors in relation to their ecological, cultural, and intercultural contexts (Berry, 1976; Berry et al., 1986; Mishra et al., 1996; Georgas et al., 2006; Mishra & Berry, 2017). The ecocultural approach has also been used as an organizing framework in textbooks that seeks to integrate the vast field of cross-cultural psychology (e.g., Berry et al., 2011).

In more detail, the ecocultural framework (see Fig. 2.1) seeks to account for human psychological diversity (both group and individual similarities and differences) by considering the two fundamental sources of influence noted above: *ecological* (within the habitat) and *sociopolitical* (from outside the habitat). In adaptation to these contexts, two features of human populations (*cultural* and *biological* characteristics) become established in the group. These population variables are then transmitted to individuals

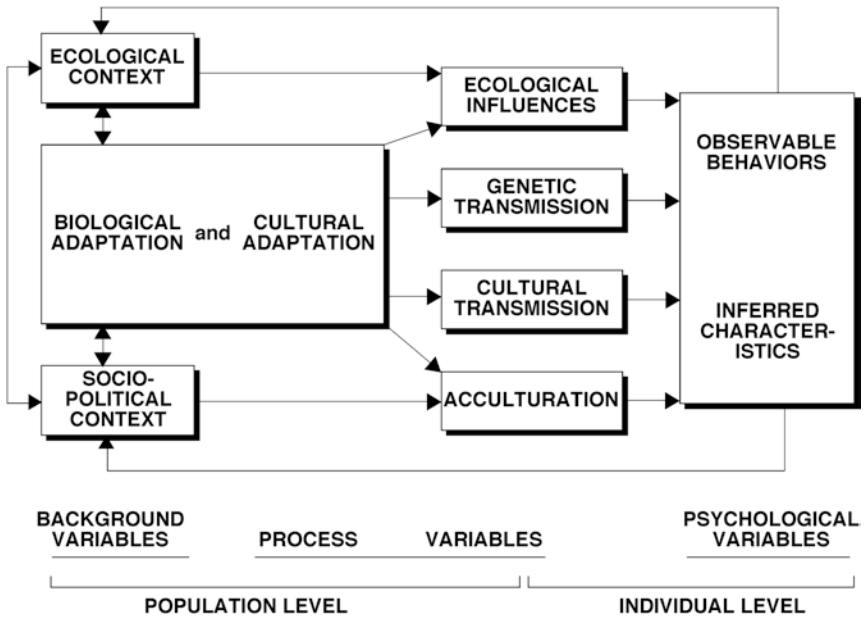


Fig. 2.1 The ecocultural framework (Berry, 1975, 1976, 1980, 1983, 1987, 1994, 1995, 2004, 2018)

by various *transmission* variables such as *enculturation*, *socialization*, *genetics*, and *acculturation*. The outcomes of these exogenous variables impacting cultural and biological adaptations result in the development and shaping of *psychological variables* (*individual behaviors*). These behaviors can be directly observed; and from these observations, we can make inferences to the presence of underlying psychological characteristics (such as abilities and traits).

This ecocultural framework provides a broad structure within which to examine the development and expression of similarities and differences in human psychological functioning (both at individual and at group levels). The framework considers human diversity (both cultural and psychological) to be a set of collective and individual adaptations to context. Within this general perspective, it views cultures as evolving adaptations to ecological and sociopolitical influences and psychological characteristics in a population as adaptive to their cultural context as well as to the broader ecological and sociopolitical influences. The ecocultural

perspective argues that together ecological and sociopolitical influences can be held to account for behavioral development and expression. Note that while the arrows linking components within the framework move from left to right (from exogenous contexts to behavior), the relationships are usually interactive, with mutual influence changing both elements in the relationship. For example, human behavior impacts the habitat of the group, and contact between groups alters the cultural characteristics of both groups. The upper and lower arrows that feed back to the exogenous contexts are intended to signify these mutual relationships within the framework.

The linking of ecology to cultural adaptation has a long history in anthropology (Feldman, 1975) and psychology (Bronfenbrenner, 1989; Jahoda, 1995; Kardiner & Linton, 1939; Whiting, 1977). These links attempt to situate human social and behavioral phenomena in their natural contexts. Linking ecology to biology to culture and then to behavior has a similarly long history, beginning with Darwin and Spencer (see Keller et al., 2002, for essays on how this fits into cross-cultural psychology). The field of evolutionary psychology (Cosmides & Tooby, 2013; Tooby & Cosmides, 2015) has served as reminder to social scientists that there are also long-term adaptations to habitat that have both biological and cultural consequences, and then onto shaping individual behaviors.

The linking of external contact to the cultures, biology, and behaviors of a society is shown at the lower level of the model stemming from the sociopolitical input. These contacts have come about as a result of exploration and colonization of Indigenous peoples, by enslavement and by the movements of refugees and immigrants. The features of a culture and the behaviors of individuals within them are both transformed by these external influences. This means that individuals must now adapt to more than one cultural context. When many cultural contexts are involved (as in situations of multiple culture contacts over years), psychological phenomena can be viewed as attempts to deal simultaneously with, and adapt to two cultures. The arrow in Fig. 2.1 connecting the two main exogenous variables in the framework (ecological and sociopolitical contexts) illustrates that they are not independent of each other. This is because of two factors. First, contact between cultures is influenced by the habitats of both the source and the destination countries. Some



locales are ecologically degraded, from which people flee; and some are attractive for colonization and settlement. The presence of resources (such as minerals, water, and arable land for agriculture) have influenced where people have invaded, migrated, and settled. Second, the impact of colonization and settlement on resident populations has been variable: Those with highly structured political, social, and military organizations are more able to resist occupation and domination. Related to this is some psychological evidence (e.g., Berry, 1976) showing that hunter/gatherers (which are usually smaller-scale societies with limited political structures to deal with the demands of invaders) have been more negatively impacted by acculturation pressures than have been more politically structured societies. Thus, we can claim that these two major inputs are related to each other and interact in ways that produce a complex pattern and flow across the ecocultural framework.

The ecological and sociopolitical lines of influence have equal conceptual status as factors in the development and display of human behavior. The actual degree of influence of each factor is variable across settings, populations, and individuals. The inclusion of the sociopolitical line in the ecocultural framework sets the stage for a more detailed examination of the changes in the conceptualization of intelligence. Although these various components have been proposed as a way to understand group and individual human behavior in their natural contexts, I was the first to assemble all these components into a systematic framework (Berry, 1975).

## Changes in Intelligence

Because intelligence is considered to be adaptive to ecological and cultural contexts, as these contexts change so also will change the cultural meanings of intelligence and the development and expression of individual intelligence.

All these changes pose challenges that require new ways of conceptualizing and operationalizing how we view intelligence. For example, *ecological* changes have brought about an increasing numbers of hurricanes and fires; this requires changing the way we understand and deal with the

interactions between human behavior and our habitats. *Cultural* changes taking place over time (both over generations and in a person's lifetime) also require new abilities and forms of intelligence. For example, the rise of use of mass media and the internet have changed the forms of literacy and communication skills. *Sociopolitical* impacts also bring about challenges, through migration, colonization, and globalization. For example, there can be a need to acquire new skills to succeed in new economic activities, and the need to acquire new ways of learning due to the imposition of formal schooling on children.

All these sources of change require continual reconceptualization and assessment of intelligence.

## Assessment of Intelligence

The capacities that make up intelligence need to be studied and assessed in ways that capture the intelligence that is conceptualized and that actually exists in a group and among individuals. This obvious fact may be illustrated by the metaphor of Sir Arthur Eddington's net (1938). In his essays on the philosophy of science, he argued that the instrument used determines the data collected.

He argued that the ichthyologist can catch fish only in a net that is appropriate to catch that fish:

Let us suppose that an ichthyologist is exploring the life of the ocean. He casts a net into the water and brings up a fishy assortment. Surveying his catch, he proceeds in the usual manner of a scientist to systematise what it reveals. He arrives at two generalisations: (1) No sea-creature is less than two inches long. (2) All sea-creatures have gills. These are both true of his catch, and he assumes tentatively that they will remain true however often he repeats it... In applying this analogy, the catch stands for the body of knowledge which constitutes physical science, and the net for the sensory and intellectual equipment which we use in obtaining it. An onlooker may object that the first generalisation is wrong. 'There are plenty of sea-creatures under two inches long, only your net is not adapted to catch them.' The ichthyologist dismisses this objection contemptuously. 'Anything

uncatchable by my net is *ipso facto* outside the scope of ichthyological knowledge. In short, what my net can't catch isn't fish'.

By extension, if the concept and the measure of intelligence are inappropriate for the intelligence being sought, then the "fish" will escape your capture. This illustrates the oft-repeated claim that "intelligence is what my intelligence test measures" (see criticisms of this tautology by Warne, 2020).

Many books have been devoted to examining the relationship between culture and cognition (e.g., Berry & Dasen, 1974/2019; Rogoff, 2003), as well as review articles written from many different perspectives (e.g., Cole & Cigagas, 2010). Rather than attempt to review these, I now report on two culturally appropriate approaches to examining the meaning and assessment of intelligence in its ecocultural contexts: indigenous cognition and cognitive styles.

One insight giving rise to both of these approaches was articulated by George Ferguson (1956, p. 121): "Cultural factors prescribe what shall be learned and at what age; consequently different cultural environments lead to the development of different patterns of ability". Thus, we should expect that different abilities will be emphasized, promoted, and developed in different cultures, and that these will be organized into some more general functional arrangement (Irvine & Berry, 1988). This perspective is relevant to both the indigenous and styles approaches to intelligence.

## Indigenous Psychologies

The first culturally appropriate approach to the assessment of intelligence is rooted in the field of *indigenous psychology*. This perspective is part of a larger movement in cross-cultural psychology that seeks to discover the meaning and expression of behaviors from the point of view of people in a specific culture (Allwood, 2020; Allwood & Berry, 2006; Kim & Berry, 1993). Part of this enterprise is the interest in the field of indigenous cognition (Berry et al., 1988).

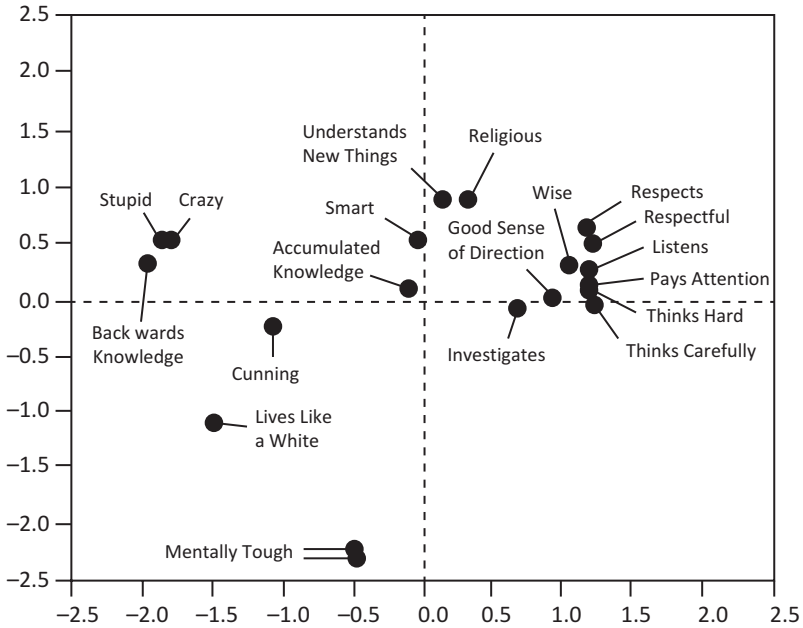
The examination of the cognitive beliefs and goals, and activities of populations, has now been studied in many cultural groups (Dasen, 1984; Sinha, 1983; Sternberg et al., 2001; Wober, 1974). The overall approach to indigenous cognition has been summarized by Berry (1987), and a theoretical framework has been articulated by Irvine and Berry (Irvine & Berry, 1988/2018). To illustrate this way of understanding intelligence from the indigenous point of view, I present one study (Berry & Bennett, 1992) among the Cree people of Northern Canada.

The Cree are traditionally a hunting and gathering society, who are now transitioning to a more urban and schooled society. The community educational council had sought an answer to the question: “Toward what goals should we be educating our children?” They knew that the Eurocanadian educational system was not working well for them and wanted to consider a Cree alternative.

In this study, both ethnographic and psychometric procedures were used to uncover what the Cree understand by notions such as “intelligent”, “smart”, “clever”, “able”, and “competent”. The first stage was to elicit Cree concepts for these and similar terms, and to seek both linguistic and contextual elaborations of them. We collected a list of 20 words dealing with cognitive competence through a series of very loosely structured interviews conducted with key informants in the Cree community of Big Trout Lake. This part of the research was broadly ethnographic.

After eliciting these Cree terms, the words were written out in the Cree syllabic script on cards. The cards were given to 60 participants, all of whom were able to read the syllabic cards. They were asked to sort the cards into piles on the basis of similarity of meaning of the terms. Multidimensional scaling revealed two dimensions (see Fig. 2.2). The horizontal axis may be seen as having a positive value on the right, and a negative one on the left. The vertical axis is less clear; however, it appears to involve openness at the top and toughness at the bottom.

As shown in Fig. 2.2, there was a cluster of words that are positive and sensitive, including the words rendered in English as “wise”, “respects”, “respectful”, “listens”, “pays attention”, “thinks hard”, and “thinks carefully”. This cluster constitutes the core meaning of competence among the Cree. It is also an example of the “pattern” of abilities proposed by



**Fig. 2.2** Multidimensional scaling of Cree concepts of competence (Berry & Bennett, 1992)

Ferguson (1956) and also constitutes a cognitive style as will be discussed in the next section.

Some of these core terms are essentially cognitive (e.g., “attention” and “thinks”), while others are social (e.g., “respects”). The core idea of respect centers around knowledge of, and personal engagement with, people, animals, objects (both human-made and natural), the Creator, and the land. Such respect for others in one’s environment is a central value among many hunting and gathering peoples. The word most directly opposite the core cluster, the word which is therefore most distant from it on both dimensions (i.e., negative and insensitive), is rendered as “lives like a white”, in the sense of behaving, thinking, and comporting oneself like a non-Cree person!

It should be clear from this study that it would be very difficult to assess the Cree meaning of intelligence with standard IQ tests. Moreover, if intelligence were measured with a test developed by the Cree, it would be difficult to make comparisons between scores on this Cree test and

scores obtained by Western groups on their tests. A study like this one leaves us with the question: How would it be possible to decide whether the Cree are more or less intelligent than some other cultural group (particularly urban, Western societies), when their vision of the competent person is so different?

## Cognitive Styles

The second alternative way to conceptualize and assess “intelligence” has been in relation to the concept of cognitive styles. I consider that the pattern of abilities suggested by Ferguson (1956) may be seen as akin to the notion of cognitive styles, which have been defined as “one’s preferred way of processing information and dealing with tasks” (Zhang & Sternberg, 2006, p. 3). These styles serve as ways of organizing and using cognitive information that allow a cultural group and its members to deal effectively with problems encountered in daily living. Interest in cognitive styles has varied over the past few decades (Sternberg & Grigorenko, 1997), but has become the focus of more attention recently (e.g., Dasen & Mishra, 2010; Lacko et al., 2020; Stevenson & Deary, 2006). In some of these studies, the interest is in the practical use of these styles in geographic navigation, as was the original interest in Inuit navigation (Berry, 1966).

I use the concept because it provides a value-free way to view individual and group differences in cognitive activity. When combined with an ecocultural approach, a less controversial, more value neutral, position is facilitated (Dasen Berry & Witkin, 1979). This is because cognitive styles view cognitive performances in relation to the adaptive needs of living in a particular context, rather than them being evaluated against some external cognitive criterion.

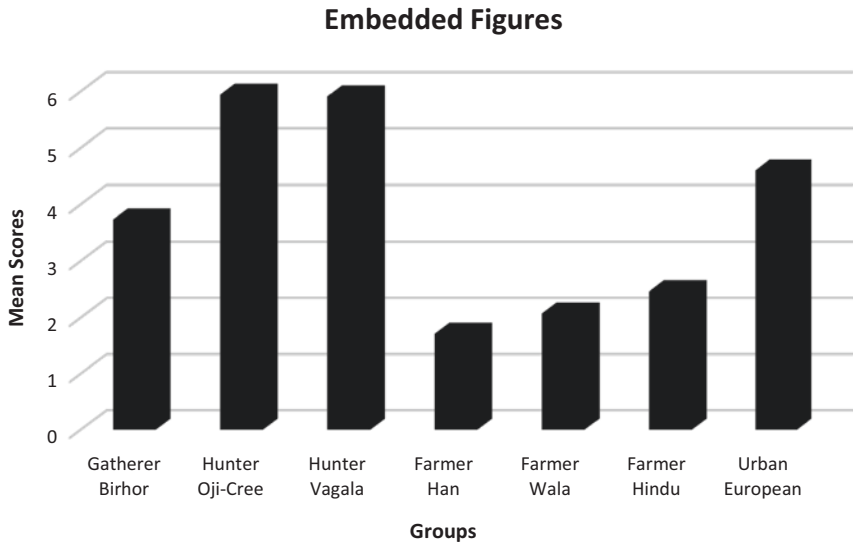
The most influential conceptualization of cognitive style has been that of Witkin (Witkin et al., 1962), who developed the dimension of the field-dependent/field-independent (FDI) cognitive style. This style is referred to by Witkin et al. (1979, p. 1138) as “extent of autonomous functioning”. The notion of cognitive style itself refers to a self-consistent manner of dealing with features of the physical and social environment.

In the case of FDI, the construct refers to the extent to which an individual typically relies upon or accepts the physical or social environment as a given, in contrast to working on it, for example by analyzing or restructuring it. As the name suggests, those who tend to accept or rely upon the external environment are relatively more field-dependent, while those who tend to work on it are relatively more field-independent.

The construct is a dimension, the poles of which are defined by the two terms; individuals have a characteristic “place” on this dimension, reflecting their usual degree of independence from the external environment. However, individuals are not “fixed” into their usual place. At one end of the FDI dimension are those (the relatively field-independent) who rely on bodily cues within themselves, and are generally less oriented toward social engagement with others; at the other end are those (the relatively field-dependent) who rely more on external cues, and are more socially oriented and competent. As for any psychological dimension, few individuals fall at the extreme ends; most fall in the broad middle range of the dimension. Examples of measures of FDI are the original Embedded Figures Test and the Portable Rod and Frame Test.

Studies over the past 50 years (reviewed by Mishra & Berry, 2017) have provided a set of ecological and cultural concepts (ecological demands, subsistence strategies, societal size, social conformity, and personal connectedness) that reveal a fairly consistent set of relationships between the basic contexts in which people live and the cognitive styles that they need to carry out their lives. These adaptive variations in cognitive and social qualities vary in a way that undermines any possibility of a claim that there is only one way of “being intelligent”.

Our recent research with the FID cognitive style (Mishra & Berry, 2017) was carried out both internationally across countries and across samples of Adivasi (Indigenous) children in India. The ecocultural framework was used to guide the international research (in Canada, China, Ghana, and India) among adults who are engaged in hunting, agriculture, and industrial activities, and also among Adivasi children (who also varied in economic base across hunting-gathering, agricultural, and wage employment groups).



**Fig. 2.3** Means of international sample adult performance on Embedded Figures Test by ecocultural context of subsistence groups (Mishra & Berry, 2017, Fig. 6.1)

## International Study Across Societies

Across countries, we sampled adults: Birhor hunters/gatherers in India; Oji-Cree hunters in Northern Canada; Vagala hunters in Ghana; Han farmers in China; Wala farmers in Ghana; Hindu farmers in India; and urban European-origin residents of a mid-sized city in Canada. Results were much as expected: mean scores on the EFT varied across the ecocultural range, with highest scores in the hunting and urban samples, and lower scores in the agricultural samples; the gatherers were in between (see Fig. 2.3).

## Adivasi Children Study in India

The Adivasi study had samples with four different ecological adaptations: hunting-gathering, dry agriculture, irrigation agriculture, and industrial

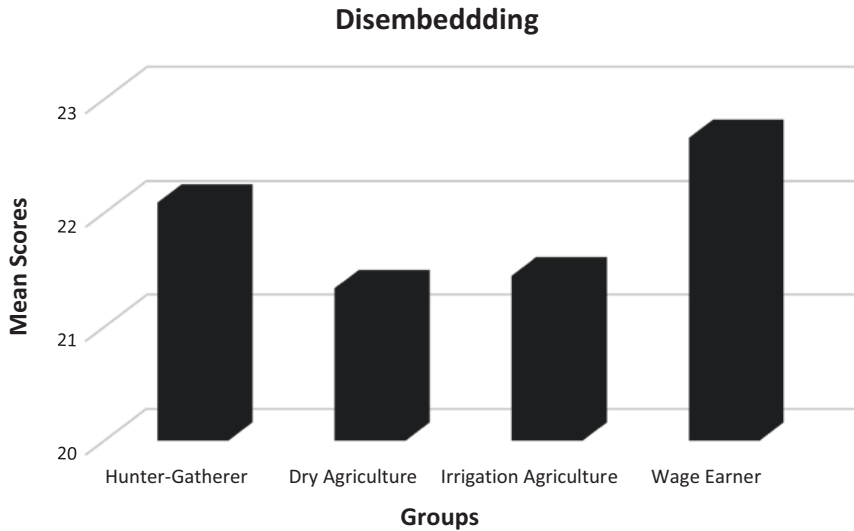


wage-earning groups. Two group variables were examined: *societal size* was assessed by a number of indicators (e.g., population density and political stratification); and *social conformity* was assessed by indicators such as the presence of hereditary hierarchical distinctions, child socialization for compliance, and role social obligations to others in the group. In addition to examining the distribution of societies on these two cultural dimensions, we assessed individuals within them on the social dimension of *personal connectedness*. The FID cognitive style was assessed by the Story-Pictorial Embedded Figures Test (SPEFT, Sinha, 1983).

We expected that the cultural variable of societal size would be low in hunting-gathering societies and increase through agricultural societies to a high in urban-industrial societies. We also expected that social conformity would be low in hunting-gathering and urban-industrial samples and higher in agricultural samples. With respect to cognitive style, we expected that the FID cognitive style would be relatively higher in the hunting-gathering and the urban samples than in the agricultural samples. We examined the relationships among all these cultural and individual-level variables to see if the cultural variables are related to the ecological ones, and if individual performance on the cognitive style task is related to their ecocultural contexts.

Our results for the two cultural dimensions show relationships with the four subsistence strategies as expected. On the measure of societal size, there is a progressive increase from hunting-gathering to wage employment samples, through the two agricultural samples. The relationship of social conformity with subsistence strategies is curvilinear: low in hunting and wage employment but high in the two agricultural groups. It is clear that a group's subsistence activities do relate in important ways to their cultural features and cognitive characteristics. These results generally support the hypothesis regarding the existence of cultural dimensions of societal size and social conformity and their linkages with the subsistence economy of groups.

The results for the social behavior variables of population-level social connectedness and individual-level personal connectedness show variations across the samples as expected: there are lower social engagements both among members in the group and in personal involvement of individuals, in the hunter-gatherer and the urban wage-earner samples; in



**Fig. 2.4** Means of performance on Story Pictorial Embedded Figures Test (SPEFT) by Adivasi children's ecocultural context of subsistence groups (Mishra & Berry, 2017, Fig. 7.4)

contrast, there is much higher connectedness in both agricultural samples. This pattern fits the expectations from the ecocultural framework. Together with the group-level findings for societal size and social conformity, these individual connectedness findings provide a comprehensive picture of the variations in the social behaviors that correspond to variations in the subsistence strategies of these ecological adaptations.

The results for the FID cognitive style (Story-Pictorial Embedded Figures Test) showed the predicted co-variation of ecocultural context with cognitive style in the Adivasi samples (see Fig. 2.4). The pattern is consistent with the prediction that hunter-gatherers would have high disembedding scores, approaching those in the urban schooled sample; in contrast, the scores of the two agricultural samples were lower. This pattern confirms the overall finding in the literature, and in our international study, that the ecological and cultural features of a population provide variable contexts for the cognitive and social development of children, and that they persist into adulthood. In short, individuals attain

a form of “intelligence” that permits them to live successfully in their particular habitats.

By conceptualizing and assessing the social variables at both the cultural group and individual levels, we can make the connection between ecological, cultural, and individual findings, and further to the cognitive-style findings. Establishing these kinds of systematic connections avoids the problem that is common in some current research (e.g., English & Geeraert, 2020) where the ecological context is described (e.g., wheat vs. rice agriculture communities in China) and then related to individual behaviors. However, the intervening cultural, social, and individual features of the populations were not actually measured, leaving them only as inferred mediating variables.

All together, these findings lend support to the earlier (Berry, 1974) proposal for the existence of both a cognitive style and a socio-affective style that vary according to different adaptations across the ecocultural range and sociopolitical conditions. Moreover, they are in keeping with my assertion (Berry, 1972) that these systematic patterns constitute differences in ways of being “intelligent” that allow for successful adaptation in different habitats.

## Implications for the Anthropocene Epoch

Given the roots of my views on intelligence in the ecological perspective, it is clear that the focus on the long-term adaptation of cultures and individuals to their habitats can be incorporated into discussions of the Anthropocene, and its way of understanding how human life has come to be interacting with the natural world. The Anthropocene Epoch can be defined not only as the period in history in which human activity has altered this natural world, but one in which it has done so in mainly negative ways, and with mostly disastrous outcomes.

The main life challenge confronting human beings is how to engage the natural world in our quest to live successfully in it (Aberle et al., 1950). We can approach this issue with the help of the classic psychoanalytic strategies for dealing with such challenges that were proposed by Horney (1945). She conceptualized these strategies as: moving with

them, moving toward them, moving away from them, moving against them, and moving under them. Following this sequence, these strategies result in mutual adaptation (moving *with* the challenge, to accommodate them), changes to the self (moving *toward*, to accept and become more like the source of the challenge), withdrawal (moving *away*) from or disregarding the challenge, attempting to dominate and change the source of the challenge (moving *against*), and succumbing to (going under) the challenge. In my view, the Anthropocene has seen the predominant use of moving against the natural world, attempting to change it and to use it for our advantage.

However, the other strategies have been manifest in a few specific domains. For example, in the case of migrants they move away (emigration) and move toward (immigration). They sometimes move against (confront) the new society in response to being subjected to invasion and discrimination; and sometimes they succumb to the difficulties encountered in the migration experience (going under).

The acculturation strategies framework proposed for immigrants (Berry, 1980, 2005) mirrors these more general life strategies. The original chapter in 1980 was titled “Acculturation as varieties of adaptation” in order to make an explicit link between these general adaptation strategies and the various way that immigrants can deal with the challenges of living in two or more cultures. These strategies are based on the intersection of peoples’ orientations to two issues: the degree to which they want to maintain their heritage cultures and the degree to which they wish to participate in the larger society within which they now live. These are: *Integration* (retaining the heritage culture and identity, while participating in the new society; *with*); *Assimilation* (giving up the heritage culture and becoming absorbed in the new society; *toward*); *Separation* (maintaining the heritage culture while disengaging from the new society; *away* or *against*); and *Marginalization* (giving up the heritage culture, while also not being engaged in the new society; *under*).

With respect to the main issue of how human beings deal with the natural world, these same strategies may be observed. They appear to vary across the range of economic subsistence practices that were examined in the previous section: gathering, hunting, dry agriculture, irrigation agriculture, and industrial practices. The first two economic practices are largely *living with* the habitat, while the last is essentially one of

*domination over* it; agriculture falls somewhere in between, with a combination of stewardship and exploitation. They also appear to be useful ways to understand the ways in which groups and individuals deal with the cultural and economic changes being introduced from outside their cultures. These variations have implications for other domains, such as climate change and pollution, food security and water quality, and possibly the emergence of pandemic disease.

In conclusion, I believe that we can learn from other cultural groups that have engaged, and continue to engage, the natural world by using these various strategies. Ways of living *with* natural habitats have survived in indigenous populations in many parts of the world, and have resulted in minimal conflicts with the inanimate and animate resources present in the ecosystem. However, living *against* (or especially *over*) the natural world has brought us to our present crisis. Taking lessons from other cultures, especially indigenous cultures, about how to achieve a balance in our relationships with the natural world, through observation, listening, reflection, and respect may serve us well as we continue to try to live in the Anthropocene.

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