The Relationship Between Culture and Cognition: New Perspectives on Old Problems*

[English version]

La relación entre cultura y cognición: nuevas perspectivas para viejos problemas

A relação entre cultura e cognição: novas perspectivas para antigos problemas

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Juana Chaves Castaño **
https://orcid.org/0000-0002-3616-511X
CvLAC https://scienti.minciencias.gov.co/cvlac/visualizador/generarCurriculoCv.do?cod_rh=0001094343
Colombia

Christian Hederich-Martínez***
https://orcid.org/0000-0003-1080-9973
CvLAC https://scienti.minciencias.gov.co/cvlac/visualizador/generarCurriculoCv.do?cod_rh=0000096377
Colombia

Abstract

Objective: The objective of this reflection paper is to provide a general overview of the theories and approaches that have addressed the relationship between cognition and

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**Ph.D. Student in Cognitive Sciences at Universidad Autónoma de Manizales, Colombia. Anthropologist. Email: juanac.chavesc@autonoma.edu.co

*** Ph.D. in Psychology. Universidad Pedagógica Nacional, Bogotá- Universidad Autónoma de Manizales, Colombia. Email: christian.hederichm@autonoma.edu.co

culture, from classical models to more recent ones, in order to discuss the relevance of contemporary ecocultural frameworks and their application in studies on intercultural contexts. **Methodology**: This article begins with a historical review of cognitive anthropological theories and their articulation with cultural and differential psychology, based on the notion of cognitive style in the Field Dependence-Independence dimension (FDI). **Results**: The scientific implications of analyzing cultural and individual differences in isolation are discussed, and it is proposed to revisit ecocultural models from cross-cultural psychology to address the complexity of cognitive phenomena. **Conclusions**: In conclusion, the enormous potential of the ecocultural model in describing cultural influences on cognition is highlighted, using style as an indicator of individual cognitive functioning.

Palabras clave: cognition; culture; cognitive styles; ecocultural model; intercultural studies (obtained from the APA thesaurus).

Resumen

Objetivo: el objetivo de este artículo de reflexión es mostrar un panorama general de las teorías y enfoques que han abordado la relación entre cognición y cultura, desde los modelos clásicos hasta los más recientes, con el fin de discutir la relevancia de los marcos ecoculturales contemporáneos y su aplicación en estudios sobre contextos interculturales. **Metodología**: se parte de un recorrido histórico de las teorías antropológicas cognitivistas, y su articulación con la psicología cultural y diferencial a partir de la noción de estilo cognitivo en la dimensión dependencia-independencia de campo (DIC). **Resultados**: se discuten las implicaciones científicas de analizar las diferencias culturales e individuales de forma aislada, y se propone retomar los modelos ecoculturales de la psicología transcultural para abordar la complejidad de los fenómenos cognitivos. **Conclusiones**: en conclusión, se evidencia el enorme potencial del modelo ecocultural en la descripción de las influencias culturales en la cognición, al utilizar el estilo como indicador del funcionamiento cognitivo del individuo.

Palabras clave: cognición; cultura; estilos cognitivos; modelo ecocultural; estudios interculturales (obtenidos del tesauro APA).

Resumo

Objetivo: o objetivo deste artigo de reflexão é apresentar um panorama geral das teorias e abordagens que trataram da relação entre cognição e cultura, desde os modelos clássicos até os mais recentes, com o intuito de discutir a relevância dos quadros ecoculturais contemporâneos e sua aplicação em estudos sobre contextos interculturais. **Metodologia**: parte-se de um percurso histórico das teorias antropológicas cognitivistas e sua articulação com a psicologia cultural e diferencial a partir da noção de estilo cognitivo na dimensão Dependência-Independência de Campo (DIC). **Resultados**: discutem-se as implicações científicas de analisar as diferenças culturais e individuais de forma isolada, e propõe-se o retorno aos modelos ecoculturais da psicologia transcultural para abordar a complexidade dos fenômenos cognitivos. **Conclusões**: em conclusão, evidencia-se o enorme potencial do modelo ecocultural na descrição das influências culturais sobre a cognição, ao utilizar o estilo como indicador do funcionamento cognitivo do indivíduo.

Palavras-chave: cognição; cultura; estilos cognitivos; modelo ecocultural; estudos interculturais (obtidos do tesauro APA).

Culture and Cognition

Scientific interest in the relationship between cognition and culture has a long-standing tradition in disciplines such as philosophy, anthropology, and psychology. However, it was in the 1950s that this interest solidified into a specific field with the emergence of cognitive anthropology and cross-cultural psychology.

In anthropology, the notion of cognition as a dimension of human existence has been present since Edward B. Tylor's (1871) initial definition of 'culture'. Tylor defined culture as a complex whole that includes beliefs, arts, laws, morals, customs, and, importantly, the knowledge acquired by members of a society. Also well-known in the field are the works of Lévy-Bruhl (1910; 1922) on primitive mentality, influenced by the French sociological tradition of Émile Durkheim.

In later years and different regions, Margaret Mead's American cultural psychology emerged, focusing on relativizing the concept of a universal psyche through her theory of temperamental models. Mead explained that each individual is born with an innate temperament, and the surrounding society assigns them roles and labels that are either suitable or unsuitable for the culture (Mead, 1973). These roles and labels are tied to the construction that each culture makes of what it considers «innate». Thus, an umbilical cord wrapped around the neck predisposes an individual to be a painter and an artist; an epileptic, mad, or sick person is predisposed to be a leader or possess religious gifts; being born male predisposes one to be tough, strong, independent; while being born female predisposes one to be weak, emotional, and dependent. From this theoretical model, Mead (1973) classified cultures according to their temperamental model: warlike, pacifist, feminine, and masculine. As can be seen, cognition and thought, as objects of interest in explaining cultural differences, played a marginal role in anthropological discipline until 1950.

With the emergence of Cognitive Science in the mid-20th century, as an interdisciplinary approach that includes philosophy, anthropology, psychology, neuroscience, linguistics, and computer science, a favorable scenario was created for the rise of cognitive anthropology. This development was pioneered by the American anthropologist Ward Goodenough (1956), who, by defining the concept of 'culture' as everything that an individual has in their mind and must know to operate acceptably within their group, inaugurated a theoretical and methodological perspective to understand culture focused on the intersection of cognitive processes, the formal characteristics of language, and the ethnography.

American cognitive anthropology was a collective effort, with notable figures emerging during that initial period, such as Charles Frake, Benjamin Colby, Brent Berlin, and Paul Kay, and later generations like Roy D'Andrade, Claudia Strauss, Naomi Quinn, and Dorothy Holland (Blount, 2011; Reynoso, 1986). Although the approach began to decline in the 1970s due to the rise of interpretivist perspectives, it made several theoretical and methodological contributions, including componential analysis, ethnosemantics, and the notion of 'cultural models'.

Componential analysis, inspired by descriptive linguistics, aimed to identify the semantic domains of a language and their respective lexical elements or lexemes, understanding that culture determines the number of domains and lexical structures that comprise them, thereby providing evidence of the native's system of knowledge. Thus, the ethnographer's task was to analyze the components of each term in a language to locate it within a semantic domain, such as kinship terms or beverages (Frake, 1964; Goodenough, 1956).

A particularly interesting example of the ethnosemantics approach is the work of Berlin and Kay (1969) on color classification. They analyzed color terminology in 98 languages and concluded that there is a certain universality in chromatic terminology that evolves in seven cumulative stages: 1) terms for black and white, 2) terms for red, 3) terms for green or yellow, 4) terms for green and yellow, 5) terms for blue, 6) terms for brown, and 7) terms for violet, pink, orange, and/or gray. This model was later revisited by Eleanor Rosch's Prototype Theory, which expanded the discussion on the existence of natural categorization principles through which all human beings organize their reality (Rosch et al., 1976). This position contrasts with the earlier psychology and anthropology perspective, which viewed categorization as an arbitrary and learned process.

In the same vein, Holland and Quinn's (1987) proposal of cultural models suggests that it is not enough to identify the list of categories through which a culture organizes its world. Instead, it is necessary to reconstruct the discourses created from these categories to organize cultural knowledge and understand how these categories relate to behaviors; in other words, to establish the relationship between what people say and what they do.

The cultural comparisons made by anthropological studies have challenged some assumptions of universality in psychology and have revealed that many questions and approaches are not free from a cultural model, but rather reflect a distinctively Western analytical framework. In this context, it is assumed that the world operates with discernible and stable rules, contradiction is a problem to be resolved, and entities are seen as relatively independent agents. Context and relationships between people and objects are relatively minimized, or when examined, it is assumed that they operate under avoidable rules.

The above became evident in the work of European psychologists in Africa, particularly those related to the universality of the concept of 'intelligence'. After a long list of unsuccessful studies, it was concluded that it is impossible to establish cognitive universals applicable to all cultures. This stance came to be known as «radical cultural relativism» (Berry, 1971). However, in differential psychology, a concept was being developed that could contribute to the description of cultural differences from a relativistic perspective: the concept of "cognitive style".

Cultural Psychology, Differential Psychology, and Style

The notion of 'personality' and the idea that it is related to how cognition functions have deep roots in European psychology. In the field of differential psychology, the genesis of this idea can be traced back to Thurstone's studies on performance in perceptual tasks. According to his observations, two types of «attitudes» spontaneously adopted by people when making perceptual judgments are identified: one characterized by speed and closure strength, identifying individuals who tend to quickly close or organize incomplete or disorganized stimuli; and another by closure flexibility, showing the tendency to establish multiple reorganizations of the information present in the stimulus field. These two tendencies are also related to certain personality aspects: those with high closure speed tend to be sociable, while those with closure flexibility tend to be socially distant (Thurstone, 1944).

The notion of 'perceptual attitude' coined by Thurstone was quickly generalized to the concept of 'cognitive attitude' and later to 'cognitive control' by a group of researchers associated with the Menninger Foundation. The examination of these cognitive controls led to the proposal of multiple dimensions of cognitive style, most of which lost relevance over the years. Examples include the «leveling-sharpening» style (Holzman & Klein, 1954) and the «reflection-impulsivity» style (Kagan, 1966).

Parallel to the work at the Menninger Foundation, a group of Gestalt-oriented researchers led by Hermann Witkin developed a specific cognitive style dimension that remains relevant today: the field dependence-independence (FDI) dimension. From its inception, it aimed to show a coherence between the perceptual, social cognitive, and affective aspects of the individual, thus uniting the domains of cognition and personality into a single enterprise (Witkin et al., 1962).

The history of the FDI dimension is extensive and far-reaching. It originated from studying differences in verticality perception among U.S. aviators (Witkin & Asch, 1948). The results identified two types of subjects: «field-dependent» individuals (visual field), who used visual information to determine verticality, and «field-independent» individuals, who preferred proprioceptive information (not present in the visual field) for verticality perception. The FDI dimension quickly expanded to encompass other aspects of visual perception, initially related to a certain perceptual-analytical aptitude (Witkin et al., 1954), and later generalized to the cognitive domain as a mode of symbolic processing. Thus, this spectrum of relationships between perceptual and cognitive aspects was generalized into a new construct: field articulation (Witkin et al., 1962).

The field articulation construct soon began to show relationships with the social and affective dimensions of the individual, leading to its generalization and rethinking under a new form. This gave birth to the «Theory of Psychological Differentiation». From this perspective, one can distinguish between highly differentiated individuals —who experience themselves as highly segregated, both internally and externally (self-other segregation)— and highly integrated individuals. These levels of differentiation are directly related to high levels of neuropsychological differentiation (Witkin et al., 1962). A quick glance at the human types proposed by this theory places them, curiously, very close to those proposed by Thurstone's original perceptual attitudes.

In its latest formulation, FDI is assimilated into the construct describing the level of autonomy concerning external references (Witkin & Goodenough, 1985). In this case, subjects with high autonomy from external references, previously called «highly differentiated» or «articulated» or «restructuring», retain the original label of being «field-independent» (of the perceptual field). At the other end, subjects with low autonomy concerning references, «highly integrated» or with low restructuring levels, are still identified as «field-dependent».

The use of data, concepts, and methods related to "cognitive style" (the mode of functioning that characterizes an individual in their perceptual and intellectual activities) in cross-cultural research presents numerous methodological advantages.

As shown by the numerous studies dedicated to a privileged cognitive style corresponding to the Field Dependence–Independence (FDI) dimension, cognitive style can be extremely useful in characterizing qualitative differences in cognition, as it can be measured using objective techniques. The tests show a high degree of validity and reliability (Hederich et al., 2022) and make sense for socially diverse populations. Research has shown a close relationship between cognitive style and particular forms of child-rearing, making it a valuable

tool for identifying the outcomes of these methods in comparative studies of socialization patterns.

The same relationships between early family experiences and interindividual differences along the continuum marked by Field Dependence–Independence, originally observed in Western settings, have also been observed in non-Western contexts. Furthermore, differences in the modal cognitive style of some non-Western groups have been found, which could have been predicted based on the differences observed in child-rearing practices. Additionally, the prevalence of sex differences in "articulated" or "global" styles across many cultures suggests that studying the role of sex in cognitive development could be a fruitful avenue for cross-cultural research (Witkin, 1967).

There is a broad knowledge base linking socialization and child-rearing practices with cognitive style within the FDI dimension. Generally, research attempting to confirm the influence of socialization and child-rearing practices on cognitive style within this dimension has been guided by two major hypotheses: 1) the hypothesis of fostering autonomy vs. continued dependence on family authority, and 2) the hypothesis of sex role modeling.

Regarding the first hypothesis, which links fostering autonomy with field independence and continued dependence on authority with field dependence, it should be noted that, although much data supports this hypothesis, the results have not been consistent in all cases.

Support for this hypothesis can be found in the classic studies collected by Witkin and Goodenough in 1981. In one of them, field independence and its relationship with various aspects of mother-child interactions were examined. The results showed that field-independent children differed from more field-dependent children in their views on how parental authority was exercised. Field-dependent children tended to perceive their parents as arbitrary, tyrannical, and inflexible, while more field-independent children viewed their parents as reasonable, flexible, and moderate in their demands. Additionally, field-dependent children were more likely to have mothers who were strict in toilet training, severely punished assertive behavior, and pushed them to meet high standards (Dyk & Witkin, 1965).

The hypothesis of fostering autonomy vs. dependence on authority has been examined using other methodologies, such as retrospective reports of subjects' childhood experiences, but the results have not consistently supported the hypothesis (Witkin & Goodenough, 1985). Similarly, consistency has not been found when applying questionnaires to parents (previously characterized by their cognitive style) about their attitudes toward child-rearing (Busse, 1969; Claeys & DeBoeck, 1976). Overall, it could be said that there is as much

evidence for as against the hypothesis of fostering autonomy vs. dependence on family authority (Hederich, 2007).

In previous work, the hypothesis of fostering autonomy vs. dependence on family authority has been reformulated, now referred to as the hypothesis of fostering individuation vs. social integration. According to this new hypothesis, child-rearing practices that emphasize social integration through the promotion of social values, such as solidarity or generosity, and consideration of others' needs, are associated with field-dependent individuals. In contrast, child-rearing practices that emphasize individuation through respect for personal space, leadership, and individual expression tend to lead to the formation of field-independent individuals (Hederich, 2007). The data gathered on child-rearing practices in terms of permissions, controls, and punishments among Colombian adolescents have strongly supported this conjecture (Hederich & Camargo, 2001; Hederich, 2007).

The second hypothesis guiding the examination of links between socialization and child-rearing practices and cognitive style is known as the «sex role modeling hypothesis». According to this conjecture, the tendency toward one pole of the FDI dimension can be learned as a result of a modeling process linked to sex roles. As the child identifies more closely with the same-sex parent, sex role modeling would extend to include cognitive style. This hypothesis would explain the perpetuation of cognitive style differences between sexes within families.

In general, this hypothesis is confirmed by the studies of Bieri (1960) and Lynn (1962). Similarly, studies examining the effects of the presence or absence of one of the parents on child-rearing have also been consistent in supporting this hypothesis (Hederich & Camargo, 1999; 1995; 2001).

The interest in studying the influences between socialization and child-rearing practices and cognitive style lies in how these can describe and explain differences between the modal cognitive styles of cultural groups. Indeed, while socialization and child-rearing practices can shape cognitive style, these practices themselves are transmitted from generation to generation as part of the cultural reproduction process, ensuring the relative permanence of a social group's cognitive style from one generation to the next. For this reason, characterizing socialization and child-rearing practices can naturally extend to the realm of differences between cultural groups.

Most of the research that has explored cognitive style within the Field Dependence-Independence (FDI) dimension as a variable describing cultural characteristics and differences has done so to test a hypothesis known as the «social conformity-autonomy hypothesis». According to this hypothesis, cultural groups that emphasize social conformity, characterized by a greater

focus on obedience to authority, larger role differences, and stricter and more severe child-rearing practices, will show a stronger tendency toward field dependence. In contrast, groups that lean towards social autonomy, characterized by greater tolerance for autonomy, smaller role differences, and more flexible and permissive child-rearing practices, will show a greater tendency toward field independence.

In 1975, Witkin and Berry published a review that included more than thirty studies, whose results generally supported the predictions of the social conformity-autonomy hypothesis. In 1976, Witkin and Berry presented additional evidence that supported the hypothesis regarding the contrast in cognitive style between hunter-gatherer societies and sedentary farming societies. According to their findings, nomadic hunter-gatherer groups, with less complex social structures, tended towards field independence, while sedentary farming groups, with more complex social structures and a greater emphasis on conformity, showed a tendency toward field dependence.

Despite this evidence, some dissenting voices have pointed out a situation that may be more complex. Bagley, for instance, demonstrated that the cognitive style of Japanese children, contrary to Witkin's predictions and what one might expect from that type of society, showed a strong tendency towards field independence (Bagley, 1988). Some argued that this trend could be related to the characteristics of Japanese ideographic writing, which could constitute a particular type of perceptual training. However, the same author showed that this relationship was not verified (Bagley, 1995).

From another perspective, it has been argued that, rather than the hypothesis that differentiates societies oriented towards social conformity or autonomy in their relationship with cognitive style, the evidence might be more consistent in the consideration of another type of cultural polarity widely developed in anthropology: the polarity that distinguishes collectivist societies from individualistic ones; however, the data have not been entirely consistent with this hypothesis. In some cases, it has been confirmed in large samples of Colombian cultural groups (Hederich, 2007). In other cases, with samples contrasting Chinese, Taiwanese, and Central European populations, the collectivism-individualism polarity did not prove to be a strong predictor of cognitive style (Lacko et al., 2020).

Although cognitive style researchers did not initially see this as a problem, most of their studies were conducted with subjects from "WEIRD" cultures: Western, Educated, Industrialized, Rich, and Democratic, with a majority of participants being American students (Grove, 2017; Henrich et al., 2010). This imbalance in cultural data has gradually been addressed over the past

two decades, not only by psychologists but also by cognitive anthropologists, sociologists, and neuroscientists, through new theoretical and methodological proposals.

As gaps in interpretative frameworks appropriate for the psychologies of non-Western cultures became evident, cross-cultural psychological perspectives also emerged. These perspectives sought to test theories of human development, especially those of Piaget and Vygotsky (Dasen & Mishra, 2000), and to propose strategies for understanding the complex interactions between physical and social contexts, educational practices, and cultural beliefs that shape human development (Berry, 2022b; Dasen, 2022). These new perspectives, which we will outline below, articulate differential cognitive style studies with ecocultural frameworks in non-Western cultures.

Cognitive Styles and Culture: New Perspectives

So far, a general overview of the approaches that have addressed the relationship between cognition and culture has been presented, along with a more detailed examination of individual differences and cognitive styles. Both have shaped a fertile field of research that continues to pose challenges around two fundamental questions: What theoretical and methodological constructs can be developed to analyze and understand the relationship among individual cognitive processes, the physical environment, and social and cultural dynamics? And how are these constructs relevant to any individual and cultural group?

One of the earliest proposals to address these questions is the ecocultural model developed by Berry (1979, 1980, 1983, 2022a). This model seeks to understand the links between ecological and sociopolitical contexts, cultural adaptations, and individual behavior. It provides a guide for studying behavior in cross-cultural settings by incorporating variables from these different domains, and it emphasizes the importance of examining multiple contexts and their influences on individuals and their behaviors (see Figure 1).

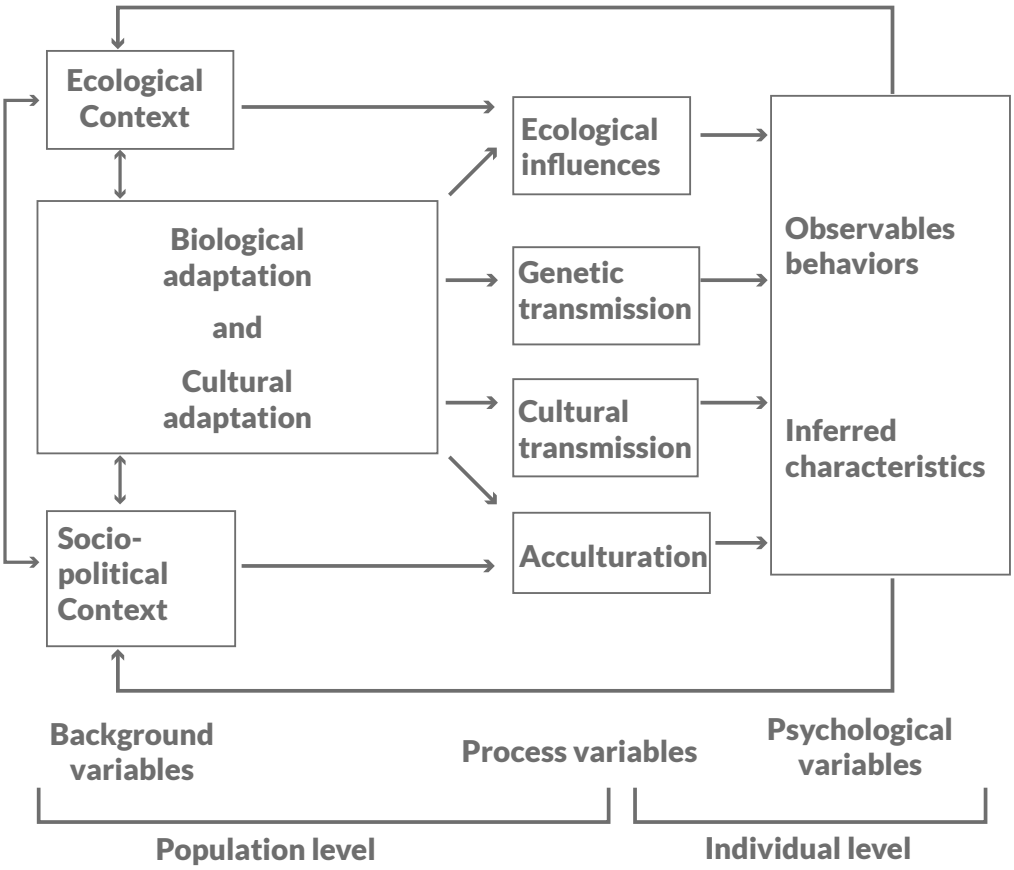

Figure 1. *Ecocultural model.*
Source: Berry, 2022a.

This model analyzes the origins of cultural and psychological diversity based on the influence of ecological and socio-political contexts on the biological and cultural adaptations of human groups. These group adaptations are transmitted to individuals through various means, such as genetic pathways, enculturation and acculturation processes, which are then reflected in their observable behaviors.

The ecological approach within the ecocultural model focuses on examining phenomena within their natural contexts and identifying the relationships between these phenomena and their ecological contexts. This includes factors

such as temperature and water availability, which can shape economic activities. The cultural approach, on the other hand, examines behaviors within the cultural contexts in which they develop and are shared through the enculturation process, such as practices of child socialization, the transmission of cultural values, and their expression in social and political institutions. When these examinations are conducted comparatively, they lead to the cross-cultural approach.

Similarly, within the ecocultural model, the sociopolitical context plays a predominant role in shaping behavior through the acculturation process, which occurs when individuals come into contact with other cultures. Indeed, the acculturation process has been shown to influence not only the original culture but also the behavior of the group, its members, and even the group's biology by modifying kinship structures that restrict or facilitate the formation of a couple with the contact culture. Thus, the ecocultural model helps to understand these complex interactions and their impact on behavior, providing a comprehensive approach to studying the influences of ecological, sociopolitical, and cultural contexts on human development (Berry, 2022b).

In addition to the ecocultural model, Berry (1979, 1980, 1983) proposes the «multilevel Arc Model» to specify the key contexts and their psychological outcomes. The model consists of four levels of arcs that link contexts to behaviors: 1) the molar arc, 2) the learning arc, 3) the performance arc, and 4) the evaluation arc.

At the highest level, the molar arc connects people's living situations in their ecological context or habitat with the general outcomes of their customs. The learning arc, at the second level, examines the specific experiences in which individuals engage within the ecological context and how they contribute to the development of their behavioral repertoire. The performance arc, at the third level, considers specific scenarios that promote or hinder the development and performance of specific behaviors appropriate for that scenario. Finally, the evaluation arc, at the fourth level, involves creating specific tests or tasks to assess individuals' behaviors based on their prior experiences, with cognitive style studies being the most commonly used by the author in his research (see Figure 2).

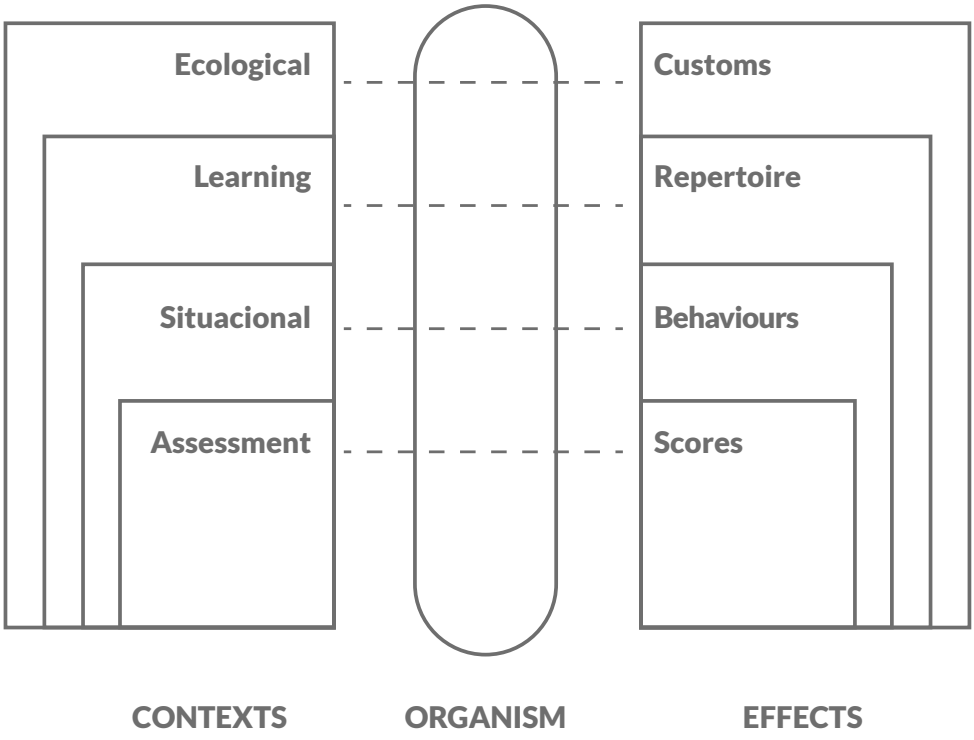

Figure 2. *Multilevel Arc Model.*
Source: Berry, 2022b.

The ecocultural model and the multilevel arc model are closely related. The former provides a general conceptual framework for understanding the links between ecological and sociopolitical contexts, cultural adaptations, and individual behavior, emphasizing the importance of considering multiple contexts and their influences on behavior. The multilevel arc model, on the other hand, is a specific framework within the ecocultural model that aims to specify the key contexts and psychological outcomes. It identifies four levels of arcs that link contexts to behaviors and provides a structure for understanding how different contexts influence behavior at various levels (Berry, 1979, 1980, 1983, 2022b).

Another proposal to address the fundamental questions is Dasen's (2022) «integrated theoretical framework» for cross-cultural study, inspired by the cognitive development work of Piaget and Vygotsky, and incorporating Berry's

ecocultural perspective through Bronfenbrenner's concentric circles model (1989). This model suggests that child development occurs within the microsystem of a «developmental niche», which consists of the physical body and the specific social contexts in which the child lives, educational practices, and parental ethnotheories. At the mesosystem level, enculturation and socialization processes are positioned as the primary mechanisms of cultural transmission, though acculturation processes must also be considered. Both the educational practices and parental ethnotheories found in the microsystem are connected to values and cosmologies present in the macrosystem, such as religious beliefs and practices (see Figure 3).

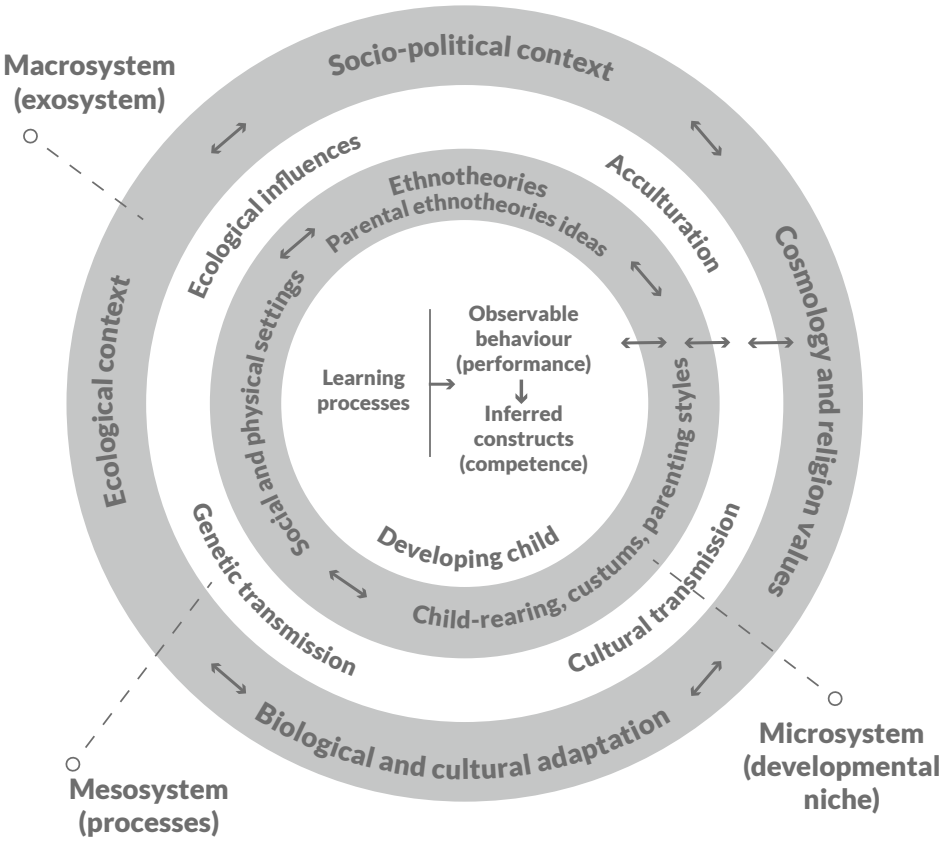

Figure 3. *Integrated Theoretical Framework*
Source: Dasen, 2022.

It is interesting to note that within this model, the construct of cognitive style is revisited in relation to observable behavior and competencies, although it diverges from the FDI dimension. Indeed, Dasen argues that while FDI has been the most studied cognitive style cross-culturally, it has focused on comparative analyses between predominantly Western, mostly American, societies and other «non-Western» ones, such as Asian societies. This approach tends to identify style differences as a matter of the absence or presence of a particular cognitive process.

Considering that the integrated theoretical model is grounded in an eco-socio-cultural perspective, Dasen proposes a quasi-experimental methodology through the geocentric versus egocentric framework in relation to spatial orientation. In this context, some cultures locate objects on a small scale using large-scale geographical dimensions (north/south, east/west, upriver/downriver, mountain/sea), while others use body-relative dimensions (right/left) (Dasen, 2022; Dasen & Mishra, 2013; Dasen et al., 2018).

While the geocentric-egocentric framework suggests certain methodological relevance in terms of using appropriate tests for non-Western cultures, it is still based on a dichotomous relationship of perceptual processes regarding orientation relative to oneself or the environment. In this sense, the issue should not focus on the construct itself, which remains valid, but on the techniques used to operationalize it and how these can be adapted to the eco-socio-cultural conditions of the research setting.

The ecocultural and integrated theoretical models have had an impact on recent studies concerning the relationship between cognition and culture in contexts with ethnic, geographical, and vocational differences, among others. Generally, these investigations have decided to use the concept of cognitive style as an analytical variable, whether in the dimension of field dependence-independence, holistic-analytic, or collectivism-individualism, among others.

One of the areas with the most applications of this model is the educational context. Onyekuru (2015), for example, studied the relationship between FDI, university career choice, and gender in students nearing graduation from secondary school in Nigeria. A similar study was conducted by Hederich et al. (2022) with university students in Colombia. Both found a significant relationship between cognitive style and vocational training choices. Regarding the relationship between gender, training area, and cognitive style in educational contexts, Muhammad et al. (2015) found that there is a relationship between FDI cognitive style, gender, and academic achievement among biology students at a Nigerian university.

Another study in the educational area analyzed the influence of the ecological context on cognitive styles. This research was carried out by Aboritoli (2021) in rural and urban schools in Nigeria and demonstrated that the school's location

significantly contributes to the variations in cognitive styles adopted by rural and urban students. Thus, the physical environment could stimulate particular ways of processing information. Therefore, it is likely that the variation in cognition underlying cognitive styles changes fundamentally when the physical or sociocultural environment itself changes.

The work of Baess et al. (2022) is another example of the use of these models in cross-cultural research. Baess and colleagues studied how individuals from individualist cultures (Australians and Germans) and collectivist cultures (Chinese and Malaysians) encode space through cognitive processes to address the «Simon effect». This effect refers to a conflict between dual processing routes: one route based on instructions and another automatic route based on spatial stimuli, as occurs when a driver accustomed to driving on the right side must suddenly begin driving on the left, as it is in England or Australia. The results allowed the researchers to conclude the universality of the Simon effect, independent of individualist and collectivist styles.

In another example, Senzaki et al. (2014) studied drawing styles and types of pictorial representation of the horizon in Canadian and Japanese students. Their results indicated significant variations in representation styles. Specifically, they documented variations in the location of the horizon line according to the holistic ideology, predominantly present in Japanese children, versus the analytic one, present in Canadian children (Senzaki et al., 2014). These results were later compared with those obtained in a case study conducted in Mongolia, which indicated significant cultural differences between Mongolian, Canadian, and Japanese children, while simultaneously revealing universal patterns of human development regarding the concept of the horizon (Masuda et al., 2022).

In Colombia, comparative studies on cognitive styles have been conducted among students from different Colombian cultural groups (Hederich & Camargo, 1995, 1999; Hederich, 2007). These studies have shown how the cognitive styles of secondary school students from different Colombian cultural regions exhibit significant differences. Such differences, in turn, are linked to aspects related to family structure, the structure of authority within the family, and certain child-rearing practices, especially those indicating relative permissiveness and rigidity, closely related to content that is either limited or permitted. On one hand, if social activity was encouraged and individual autonomy was restricted, the results indicated a tendency for adolescents to lean toward the field-dependent pole. On the other hand, if a sense of separate identity was fostered, individual autonomy was intensified, and social activity was limited by controls and boundaries, the opposite cognitive style was encouraged (Hederich, 2007).

Conclusions

In conclusion, the ecocultural model demonstrates an important heuristic potential for studying cultural influences on cognition and using cognitive style as an indicator of an individual's cognitive functioning. Thus, cognitive style, which is initially an individual-level variable, can prove to be useful for describing the cognitive characteristics of a cultural group in such a way that they can be expressed in terms of the modal cognitive style of its members; therefore, it is still a valid tool for understanding intercultural phenomena. However, the methodological challenge will undoubtedly be guided by the review of existing tests to identify cognitive styles in light of their correspondence with the cultural specificities of the societies where they are applied, even requiring the development and validation of new instruments.

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