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**Measuring Core Dimensions of Organizational Culture:
A Review of Research and Development of a New Instrument**

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Abstract

This paper reviews twenty organizational culture questionnaires to identify the common cultural dimensions tapped and the level of psychometric support for these dimensions. Conceptual overlaps between questionnaires bring to the fore four core dimensions of organizational culture. Nevertheless, no instrument covers with precision and exhaustiveness these four conceptual domains. Moreover, psychometric support for most instruments is weak. Consequently, the paper describes a new culture measure (ECO) able to capture the commonality among cultural dimensions. The instrument was tested with a large sample of respondents working in a diversity of firms and industrial sectors. This new measure demonstrated improved psychometric properties as well as strong convergent-discriminant and consensual validity. Overall, results supported the view that generic cultural dimensions can be identified. The implications of these findings for culture research and measurement are discussed.

Résumé

Cette étude passe en revue une vingtaine de questionnaires de culture organisationnelle afin d'identifier les dimensions culturelles communes à ces instruments et examine les qualités psychométriques de ces échelles. Les recouvrements conceptuels entre ces instruments mettent en évidence quatre dimensions culturelles centrales. Toutefois, aucun des instruments analysés ne couvre avec suffisamment de précision et d'exhaustivité ces quatre domaines conceptuels. En outre, la plupart présentent d'importantes faiblesses psychométriques. En conséquence, un nouvel instrument (Echelles de Culture Organisationnelle) a été développé de façon à couvrir un ensemble suffisant de dimensions culturelles génériques. La validation de cet instrument sur un vaste échantillon de répondants issus d'entreprises diversifiées démontre des qualités psychométriques appréciables, notamment en termes de validité convergente et discriminante et de validité consensuelle. De manière générale, cette étude tend à confirmer l'existence de dimensions culturelles génériques. La discussion se centre sur les implications de cette étude en matière de conceptualisation et de mesure de la culture organisationnelle.

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Organizational culture is postulated to be one of the greatest theoretical levers required for understanding organizations. Verifying and using those theories minimally requires comparisons between the cultures of different firms, which in turn implies the identification of common dimensions for assessing organizational culture.

Qualitative approaches used in initial research on organizational culture assess culture along unique dimensions, reflecting the inner view of organization's members. Although rich in detail, this process has two inherent weaknesses: (a) the dimensions of culture identified in one milieu through this approach are idiosyncratic and not necessarily relevant in another context, (b) this approach is unable to produce culture information coherently linkable to major outcomes such as organizational performance (e.g., Cameron & Freeman, 1991) and individual behaviors (e.g., Koberg & Chusmir, 1987).

To allow comparisons across organizations and to study relationships between organizational culture and other constructs, several quantitative measurement instruments have been designed. These capture culture through a priori dimensions which is helpful only to the degree that these dimensions are sufficiently relevant and generic. Chatman and Jehn (1994) put this nomothetic challenge in these terms: "Demonstrating that a set of replicable dimensions exists is a prerequisite to making meaningful comparisons across organizations and industries" (p.525). Regrettably, to date, there is no consensus on a finite set of key dimensions able to describe and to compare organizational culture across a large range of organizations (Gordon & Di Tomaso, 1992). This paper attempts to fill that void by identifying core culture dimensions in current questionnaires and by synthesizing these into a new instrument.

Definition of Organizational Culture

There is considerable overall agreement as to the general definition of organizational culture and most questionnaires define culture as: "a set of cognitions shared by members of a social unit" (O'Reilly, Chatman, & Caldwell, 1991, p.491), or more fully: "a system of shared values and beliefs that produces norms of behavior and establish an organizational way of life" (Koberg & Chusmir, 1987, p.397).

This latter definition is important because it pinpoints that the culture construct can be equivocally understood to deal with "major beliefs and values" (Goll & Zeitz (1991), or alternatively as "norms and patterns of behaviors and norms"(Gundry & Rousseau, 1994). As Table 1 shows, questionnaires fall in the two types: those that measure culture from a values or a norms perspective.

Table 1**Generic Dimensions of Organizational Culture**

Culture Questionnaire	Nb items	People orientation	Innovation	Outcome orientation	Bureaucratic orientation	
Value Inventories						
Organizational Culture Profile (O'Reilly, Chatman, Caldwell, 1991; Chatman, 1991; Chatman & Jehn, 1994; Sheridan, 1992)	54	Respect for people Team orientation	Stability	Innovation	Outcome orientation	(Attention to detail)
Hofstede et al.(1990) - Values	57		Need for security		Aggressiveness Work centrality	Need for authority
Calori & Sarnin (1991)	60	Solidarity Internal cooperation Personnel involvement and Know how	Authority	Attitude/change	Firm's performance	
Organizational Culture Index (Litwin & Stringer, 1968; Wallach, 1983)	24	Support culture	Innovative culture			Bureaucratic culture
Organizational Beliefs Questionnaire (Sashkin, 1984)	50	Worth and value of people	Innovation		Being the best Growth/profit	(Attention to detail)
SYMLOG (Poumadère, 1985)	26	Individualism- egalitarianism	Acceptance vs. opposition to management's task orientation		Dominance-obedience	
Competing Values Model - Focus 93 – evaluative part	40	Support	Innovation		Goals	Rules

(table continues)

Table 1 (continued)

Culture Questionnaire	Nb items	People orientation		Innovation	Outcome orientation	Bureaucratic orientation
Patterns of Behavior Questionnaires						
Organizational Culture Inventory (Cooke & Lafferty, 1989)	120	Task culture	People culture	Security culture	Satisfaction culture	
Hofstede et al.(1990) – Practices	54	Employee vs. job oriented			Process vs. results oriented	
Culture Gap Survey (Kilman-Saxton, 1983)	28	Technical concern	Human concern	Short term orientation	Long term orientation	
Competing Values Model (Rohrbaugh, 1991)	38	Cohesion morale Human resources		Stability	Flexibility	Productivity Planning
Competing Values Model (Quinn & Spreitzer, 1991)	16	Group culture		Developmental culture		Rational Culture Hierarchical Culture
Competing Values Model - Focus 93 – descriptive part	37	Support		Innovation	Goals	Rules
Reynolds (1986)	14	Task vs. Social Ind. Vs. coll. decision-making Cooperation vs. competition		Safety vs. risk Stability vs. Innovation (Extern vs. intern emphasis)	Informal vs. formalized procedure	
Comparative Emphasis Scale (Meglino, Ravlin, Adkins, 1989; Adkins, Ravlin & Meglino, 1996)	24	Helping and concern for others			Achievement	
Survey of Management Climate (Gordon & DiTomaso, 1992)	61	Integration/ communication		Development and promotion Fairness of reward Innovation/risk taking	Clarity of strategy/shared goals Action orientation	
Organizational Norms Opinionnaire (Alexander, 1978)	42	Colleague/ Associate relations Teamwork/ communication Training/ developmen		Innovation/ creativity	Performance/ excellence Profitability	

Dominant as they are, “values” and “norms” are only the intermediate levels of the multi-layers model of culture proposed by Schein (1985) and Ott (1989). “Artifacts”, the most superficial manifestations of culture, and “basic assumptions”, the deepest layer of culture are the other two levels of culture. Artifacts and basic assumptions have been typically studied using qualitative approaches. Values and behavioral patterns, this paper’s focus, have been measured using quantitative instruments.

Organizational values refer to the principles which underlie patterns of behaviors and norms. A typical questionnaire item would read the degree to which “respect for individuals” or “flexibility”, for instance, are characteristics of the firm’s culture. Questionnaires designed to assess organizational culture as shared values include the Organizational Culture Profile, the Organizational Culture Index and the Comparative Emphasis Scale (see Table 1). The main advantage of this category of instruments is their commensurate measurement scheme where individual preferences and organizational values are assessed along the same dimensions, enabling estimations of congruency. Hence these measures have been useful in the study of person-organization fit as a predictor of work attitudes and behaviors (see Vandenberghe & Peiro, 1999). But they have other merits. Hofstede (1980)’s study indicates that cultural values reliably distinguish national subsidiaries of a multinational corporation. Values belong to people more than to organizations and, to paraphrase Hofstede, Neuijen, Ohayv and Sanders (1990), organizations import values more than they create them. Appraisal of values, therefore, may be of particular significance to the recruitment and selection sub-system within organizations. At the same time values appear less sensitive to differences between firms within the same national culture (Hofstede et al., 1990).

Patterns of behaviors and norms have been defined as the “ways of thinking, behaving, and believing that members of a social unit have in common” (Cooke & Rousseau, 1988). “Continuing to work on a problem until it is resolved” or “trying to help a fellow worker through a difficult time” are examples of behavioral patterns characterizing an organization (Meglino, Ravlin, & Adkins, 1989). The Organizational Culture Inventory and the Culture Gap Survey are prototypical examples of questionnaires which are structured around norms and patterns of behavior. This level of cultural manifestation is more sensitive than values to inter-organization variations and learning processes. Compared to values, behavioral norms would be easier to learn and they could be readily influenced by the organization, through the management practices. As Gundry and Rousseau (1994) put it: “newcomers are likely to experience and incorporate as their own the more perceptible and concrete aspects of culture such as norms and patterns of behavior before they are able to internalize values” (p.1064). Indeed, Hofstede et al (1990)’s data show that the different organizations within the same national culture could be distinguished from the behavioral norms (day-to-day practices) they differently adopt and not from their values. Because of their sensitivity to change and to inter-organizations variations, behavioral norms questionnaires produce information particularly useful for the purpose of intervention.

Hence, values inventories and behavioral patterns questionnaires measure two distinct but articulated levels of a cultural system. Moreover, these two measurement approaches are suitable for different scientific and practical purposes.

Development Strategies for Culture Instruments

The diversity of cultural traits measured by current questionnaires can partly be explained by the strategy used for developing each instrument. Some instruments measure values and behavioral norms that are peculiar to a specific organization (Enz, 1988), a work situation (e.g., loitering as in Amsa, 1986), or an occupational group (e.g., marketing [Webster, 1993], or top management [Goll & Zeitz, 1991]). Very context sensitive, these instruments lack sufficient generality for their use across cultural dimensions and across organizations.

But a number of instruments do have applicability across contexts. Their development falls in two categories. Some were developed rationally through an a priori conceptual framework defining relevant dimensions of organizational culture (e.g., the Organizational Culture Inventory; the Organizational Culture Profile; the Competing Values Model). Alternatively, others were developed empirically through in-depth interviews of large samples of organization members (e.g., the Survey of Management Climate; the Hofstede et al.'s Practices Questionnaire; the Comparative Emphasis Scale). Some questionnaires are hybrids, combining both these deductive and inductive approaches (Calori & Sarnin, 1991), while still others failed to provide information regarding the way they were built (Organizational Norms Opinionnaire; Symlog). Finally, in this development process, some instruments' dimensions are supported by empirical data (e.g., the Organizational Culture Profile, the Competing Values Model, and Calori & Sarnin's and Hofstede et al.'s questionnaires) whereas others are exclusively speculative.

Table 1 organizes the culture dimensions along a 2 X 2 matrix: (1) the focus on values or behavioral norms, and (2) the selection of specific cultural dimensions. The dimensions assessed by each instrument are listed under generic labels as well as with the exact nomenclature which the authors of the instrument used. As may be readily observed, values and patterns of behaviors questionnaires tend to measure different as well as some common traits.

Common Dimensions Across Questionnaires

Four basic dimensions or conceptual domains appear to be common to most questionnaires. First, a "people orientation" reflecting perceived support, cooperation, mutual respect and consideration between organizational members is prevalent. This orientation refers for instance to the group culture quadrant of the Competing Values Model or to the support culture in the Organizational Culture Index. Some questionnaires such as the Organizational Culture Profile or the Organizational Norms Opinionnaire, distinguish a sub-dimension referring to teamwork. Others (e.g., the Organizational Culture Inventory and Hofstede et al.'s practices questionnaire) oppose on the same continuum "people orientation" to "task orientation". Task orientation appears as a dimension per se in the Organizational Culture Inventory and in the Culture Gap Survey. Probably also related to a people orientation is the emphasis on human resources development assessed by different instruments (the Organizational Norms Opinionnaire, Rohrbaugh's Competing Values Model and Calori & Sarnin's instrument).

Second, an "innovation" dimension, indicating general openness to change and propensity to experiment and take risks is also apparent. In Reynold's (1986) instrument, risk and innovation are opposed to safety and stability. Note also that the construct of stability is measured by a specific scale in the Organizational Culture Profile and the Organizational Culture Inventory, among others.

Third, "control" is another significant component. It focuses on the level of work formalization, the existence of rules and procedures and the importance of the hierarchy. This construct is similar in tone to the "bureaucratic" dimension prevalent in some instruments (e.g., in the Organizational Culture Index, the Competing Values Model and Reynolds' instrument). Attention to details (present in the Organizational Culture Profile and the Organizational Beliefs Questionnaire) is probably close though conceptually narrower.

Finally, "results/outcome orientation" is another core dimension, that measures the level of productivity or performance expected inside an organization. In the Symlog or in Hofstede's practices questionnaire, this dimension is bipolar. Conceptually close is Reynolds' construct of "extern vs. intern emphasis" that refers to the task of satisfying customers or clients.

Table 1 clearly shows that the number and labels of scales covering each of these four conceptual domains differ greatly from one instrument to another. This diversity compels three observations. First, despite of the need for measuring a sufficiently exhaustive set of replicable cultural traits (Chatman & Jehn, 1994), no instrument covers the full range of dimensions. Instead, several questionnaires assess specific dimensions with arcane or limited generality (i.e., Hofstede et al. (1990)'s "parochial versus professional" and "normative versus pragmatic" orientations). Hence, cultural traits measured by current questionnaires don't appear to be sufficiently exhaustive and inclusive. Second, the homogeneity or unidimensionality of each conceptual domain is questionable. On the one hand, it is unclear that the different scales listed under a common core dimension equally saturate (or not) the same conceptual domain. For instance, is the "support culture" concept (Organizational Culture Index) identical to the "group culture" concept (Competing Values Model)? The reverse, that some generic dimensions could in fact be composed of empirically distinct concepts may also be true. For instance, in the Organizational Culture Profile, the "stability" dimension is empirically distinct from the "innovation" factor. Finally, different labels may be conceptually redundant inside or even between conceptual domains. For example, no data support the relevance of Reynold (1986)'s distinction between "individual vs. collective decision-making" and "cooperation vs. competition" inside the people orientation. Moreover, Cooke and Rousseau's (1988) data show that common factors underlie items tapping the security culture and items relative to the task and people cultures in the Organizational Culture Inventory.

In effect, the plethora of labels available to assess culture characteristics signal the need for empirical verification of the pattern of convergent and discriminant validities for these constructs. These are issues which are easily amenable to empirical test. However, the practical difficulty of collecting several culture questionnaires from the same sample has hampered research. Quinn and Spreitzer (1991) used a multitraits-multimethods matrix approach to establish the validity of culture measures. But all questionnaires were based on the same Competing Values Model.

With the current study as an exception, only Xenikou and Furnham (1996) have examined empirical overlaps between conceptually similar scales taken from different instruments: two "values" inventories (Glaser's Corporate Culture Survey, 1983; and the Organizational Beliefs Questionnaire) and two "behavioral norms" questionnaires (the Organizational Culture Inventory and the Culture Gap Survey). The results have proved troubling: different dimensions taken from one questionnaire were

more related to each other than comparable dimensions taken from different questionnaires¹. Principal components analysis applied to the subscales of the questionnaires, uncovered factors that corresponded mainly to each specific instrument, and more generally, to the measurement level of the culture construct (values versus behavioral norms). In Campbell and Fiske (1959) terms, culture measures appear to demonstrate more method than trait variances.

Chatman and Jehn (1994)'s challenge "to establish a robust set of culture dimensions that can characterize organizational cultures" (p.525)" remains open as no single instrument provides a valid measure of a sufficiently large set of generic cultural dimensions.

Psychometric Requirements for Measures of Organizational Culture

Convincing measures of organizational culture should empirically demonstrate four characteristics. The first two are axioms of classic psychometrics: (a) measures should have high variance and (b) the scale overlap should be low. The last two criteria, (c) consensual validity and (d) inter-organizational discrimination, are more specifically relevant to culture instruments.

The issue of variance. Because restricted variances attenuate correlation, Glick (1985) argued that the validity of climate and organizational culture questionnaires can only be established on samples of diversified organizations from various industries. Some instruments (e.g., the Organizational Culture Profile and the Organizational Culture Inventory), albeit not all, satisfy this requirement and prove their generalizability across a large set of industries.

Scale overlap and discriminance. Glick (1985) rightly recommends the use of multimethod assessments techniques such as Campbell and Fiske's (1959) approach to ensure convergent and discriminant validity of organizational culture questionnaires. This procedure helps determine if instruments tap into, and distinguish between, generic cultural traits, regardless of the method used.

Consensual validity. As noted by Klein, Dansereau, and Hall (1994), measuring an organization-level phenomenon through individual perceptions requires that instruments assess traits that are sufficiently invariant across the members of a given organization. This is what Rousseau (1990) means by consensual validity. Psychometrically, the dimensions tapped must detect sufficient homogeneity among individual perceptions. Some questionnaires on culture do provide evidence of consensual validity (e.g., the Organizational Culture Profile and the Competing Values Model) while for others it is weaker (e.g., the Organizational Culture Inventory). But most provide no relevant information at all.

Discrimination. As implied in Chatman and Jehn (1994)'s challenge, a valid culture measure must be able to distinguish between organizations. Three questionnaires stand out in this regard: the Organizational Culture Profile, the Organizational Culture Inventory and the Focus 93. All provide scale scores that vary widely across organizations.

Summary Appraisal of Culture Measures

Although most questionnaires overlap on some core dimensions, none provides coverage of a sufficiently wide range of generic and distinct cultural traits. Moreover, most culture measures provide scant, incomplete or troubling psychometric information, especially concerning their convergent and discriminant validity. The development of a generic instrument to assess culture, which respects the foregoing conceptual and empirical criteria appears warranted.

The Present Study

This study describes the development of an organizational culture questionnaire - known under its French acronym ECO (Echelles de Culture Organisationnelle). The instrument is developed to focus on inter-organizational differences and acculturation processes and is consequently formulated in terms of patterns of thinking and behaving.

In all, three quantitative data collections are reported as are five different series of psychometric analyses which are labeled studies 1 through 5. Study 1 describes data used to analyze items variance as well as the construction process of preliminary scales. Study 2 constructs the final structure of ECO through a principal components analysis and provide reliability coefficients. Study 3 provides stability coefficients using a test-retest procedure. In study 4, some ECO dimensions are correlated with similar dimensions of another culture instrument using the multitrait-multimethod procedure. This study deals with the convergent and discriminant validity of ECO. Study 5 deals with the last two fundamental requirements for culture measures: consensual validity and the ability to differentiate organizations.

Item pool generation

In keeping with DeVellis (1991), an initial pool of items (355) was generated to reflect the main cultural dimensions identified in the literature². The specific items of each core dimension were gleaned or adapted from other culture questionnaires (e.g., Hofstede et al.'s practices questionnaire; Organizational Norms Opinionnaire). They were formulated so as to balance statements reflecting patterns of behaving (e.g., "I do obey my chief even if I don't agree"), patterns of interpretation (e.g., "Here, organization members are competent in their job"), and patterns of social judgment (e.g., "Conflicts are harmful for the good functioning of the organization"). All items were rated on a 6-point Likert-type scale ranging from 1 ("strongly disagree") to 6 ("strongly agree").

Pursuant to DeVellis' (1991) prescription, the item pool was screened by three experts in organizational psychology who didn't participate in the item generation phase. These judges independently (a) identified items that were ambiguous, redundant, too long, difficult to understand or irrelevant and (b) grouped in distinct categories those items that seemingly tapped common cultural dimensions. This initial procedure identified 89 items which were problematic for at least one judge. This produced a formatted questionnaire of 266 items (355 minus 89) which was then administered, in study 1, to permit final item selection.

Study 1: Item selection and initial scales construction

The purpose of this study was to identify a robust set of items which define a working structure for ECO. After eliminating items with insufficient variances, initial scales were refined through an iterative sequence of internal consistency and principal components analyses.

Respondents and procedure. The 266 statements were administered to a highly diversified sample of respondents (Glick, 1985) working in 9 different organizations: a high school (n = 14), a vocational school (n = 16), a workshop for disabled persons (n = 15), a public administration (n = 27), a private telecommunications firm (n = 30), a real estate agency (n = 14), a publisher (n = 15), a retail store (n = 17), and a bank regional office (n = 16). Answered on a voluntary basis, the questionnaires

were sent to a representative sample of positions, units and hierarchical levels. Questionnaires were returned directly to the researchers' office and respondents were assured of confidentiality. In total, the questionnaire was sent to 265 people and 164 were returned to yield a 62% response rate. On average, tenure was 16.6 years.

Results. Thirty-seven items with a standard deviation lower than 1.2 were deleted. On the basis of the groupings proposed by the three judges, the remaining 229 (266 minus 37) items were arranged into a priori working scales reflecting core cultural dimensions. As suggested by Green, Lissitz and Mulaik (1977), each of these initial scales were then input into an iterative cycle of internal consistency and principal components analyses.

Computation of coefficient alpha and item-to-total correlations allowed to progressively reduce each scale to a set of items sharing a common core. Item displaying the lowest correlation with the sum of all other items making up its scale was discarded so as to improve the scale's internal consistency. The sequence of computing alphas and item-to-total correlations, followed by deletion of items, was repeated for each scale until reaching satisfying levels of internal consistency. However, as pointed out by Cortina (1993), the alpha "consistency" coefficient is not to be mistaken as an index of "conceptual" homogeneity. In fact, a set of related items, which produce a high alpha coefficient, may still be composed of several underlying factors.

Consequently, as suggested by Green et al.(1977), principal components analyses with varimax rotation were performed to analyze the factor structure underlying each working scale. Items were assigned to factors when they showed loadings higher than .40 on a factor and lower than .40 on all others. These refined scales were then submitted to the computation of alpha and item-total correlation.

This iterative procedure, which stops when no further improvement can be made, produced nine scales conceptually homogeneous with internal consistency coefficients hovering in the .80 range. Each scale was composed of 6 to 14 items and labeled according to its most representative items: (1) "supportiveness-recognition"; (2) "cooperation-solidarity"; (3) "commitment-involvement"; (4) "achievement-productivity"; (5) "innovation-change"; (6) "bureaucratic orientation"; (7) "teamwork"; (8) "stability-planning"; and (9) "competence-training". Comparison of these dimensions to those measured by other questionnaires (cf. Table 1) indicates strong overlap, providing some grounds for the content validity of ECO. However, because the sample size used in Study 1 is lower than the total number of items (164 respondents and 229 items), the overall factorial structure of the scales could not be analyzed. This can result in scale inter-correlations which are higher than is desirable. Indeed, the data confirm this expectation as the scale inter-correlations ranged from .03 to .96 (mean $r = .63$), indicating sizeable overlap. As a result, Study 2 was designed to analyze the factor structure of ECO with data better suited to this issue (i.e., a better N to number of items ratio).

Study 2: Factor structure of the ECO questionnaire

Respondents and procedure. Variation is critical to maximize item variance and to ensure cross-organizational generality for ECO. Therefore, nine hundreds employees were solicited to participate in this study. They were drawn from 33 firms in diverse industrial sectors, including

manufacturing (k = 7), education (k = 6), banking and insurance (k = 6), other private services (k = 4) and public administration (k = 3).

In each organization, 25 questionnaires (except for the three largest firms that received 50) were delivered to a representative sample of positions, hierarchical levels, and departments. A cover letter, signed by the researchers, presented the study objectives and ensured response confidentiality and anonymity. Respondents were free to participate and returned their questionnaires to the researchers' office using a pre-stamped envelope. Out of the 900 mailed questionnaires, 610 were returned, for a response rate of 68%. Respondents' average age and tenure were 40.7 years and 15.7 years, respectively.

Results. Table 2 presents the results of the principal components analysis with varimax rotation which was used to examine the structure of the ECO questionnaire.

Table 2
Study 2: Descriptive Statistics for ECO Dimensions

Dimension	<u>M</u>	<u>SD</u>	Nb of items	Eigenvalue	% Explained variance
1. Support-gratefulness	3.71	1.01	19	24.48	26.48
2. Commitment-solidarity	4.01	0.87	17	5.39	5.73
3. Productivity-innovation	4.02	0.91	14	3.76	4.00
4. Rules	4.20	0.82	9	3.15	3.36
5. Continuous learning	4.16	1.01	5	2.47	2.63

Note. N = 610.

Five orthogonal factors, with eigenvalues of 12.19, 10.92, 8.36, 4.44 and 3.37, respectively, were extracted, accounting for 42% of the total variance (the full factor solution is available upon request). This five-factor structure was contrasted with four- and six-factor solutions, using the reproduced correlation matrix. Only the five-factor structure generated an optimal amount of positive and negative residual values. Factors were defined by items with a loading of at least .40 and no cross-loading. The factors were defined using a unit weighting scheme to average the items and each was labeled with reference to the most representative item (i.e., highest factor loadings). Table 2 also presents the descriptive statistics for the scales.

Factor 1 is labeled "recognition-supportiveness". It integrates the "supportiveness-recognition" and "stability-planning" scales detected in Study 1 (e.g., "Ici, les chefs cherchent à résoudre les problèmes des travailleurs"; translated as "Supervisors attempt to solve employee problems"). Factor 2, "commitment-solidarity", combines "commitment-involvement" and the "cooperation-solidarity" scales of Study 1 into a single measure (e.g., "Les gens sont en général contents de travailler les uns avec les autres"; translated as "People are generally happy to work with each other"). Factor 3, "innovation-productivity", reflects the importance given to intelligent

performance in the company and it too combines two scales from Study 1: “achievement-productivity” and “innovation-change” (e.g., ‘Dans cette entreprise, nous cherchons constamment de nouveaux produits et procédures’; translated as “In this company, we are continually striving to develop new products and procedures”). Factor 4 is “control”. It concerns how rules, formal procedures and hierarchical power govern action. It closely saturates the items from Study 1 which defined “bureaucratic orientation” (e.g., ‘Ce que j’ai à faire est déterminé par des procédures formelles’; translated as “What I have to do is strongly determined by formal procedures”). Factor 5 is “continuous learning”. It is similar in composition to the “competence-training” detected in Study 1 (e.g., ‘Je continue à me former en lisant des revues spécialisées dans mon domaine’; translated as “I continuously develop myself by reading technical journals in my field”).

Table 3
Test-Retest Reliabilities, Cronbach’s Alphas, Variation Coefficients, and Intercorrelations for ECO dimensions

Dimension	Test-Retest Reliability	Cronbach’s Alpha	Variation Coefficient				
				1	2	3	4
1. Support-gratefulness	.79	.93	.27	-			
2. Commitment-solidarity	.88	.92	.22	.71	-		
3. Productivity-innovation	.82	.88	.23	.63	.52	-	
4. Rules	.61	.76	.20	.15	.10	.26	-
5. Continuous learning	.82	.68	.24	.46	.37	.40	.13

Note. $N = 610$, except for test-retest reliability ($N = 47$). Data are from Study 2, except those for test-retest reliabilities which are from Study 3.

Table 3 presents the psychometric analysis of the scales based on Study 2 data ($N = 610$). The results show the scales to be psychometrically robust. The Cronbach's alpha coefficients range from .68 to .93³. Recognition-support, Solidarity and Innovation-productivity all show very strong internal consistency. Having fewer items, the Control and Continuous Learning scales predictably demonstrate lower but still acceptable alphas. Coefficients of variability (Howell, 1998, p. 54) range from .19 to .27, indicating the instrument’s capacity to distinguish among respondents⁴. The relative independence of the factors is analyzed through the correlation matrix presented in Table 3. The intercorrelations range from .71 to .10 with a mean intercorrelation of .37. Again, these levels seem reasonable⁵.

To summarize, in terms of relative scale independence, internal consistency and sensitivity to individual differences, the psychometric results indicate good to excellent scale integrity for ECO.

Study 3: Test-retest reliability of ECO

Respondents and procedure. The test-retest reliability of the ECO questionnaire was tested over a 1-month period on a separate convenience sample of 47 respondents all working in diverse

organizations. Questionnaires were handled out by the senior author together with a pre-stamped return envelope. The re-test questionnaire was identical but asked respondents to signal any major organizational changes encountered, which would have altered their responses from the pre-test situation. No such event was reported. Respondents displayed similar characteristics than those of previous samples, with average age and tenure being 44.3 years and 16.3 years, respectively.

Results. Table 3 shows the scales to be clearly reliable. The test-retest coefficients are all significant and their magnitude is sufficient (.61 to .88) and in range with other instruments. Comparatively, the Organizational Beliefs Questionnaire scales displayed stability coefficients ranging from .83 to .94 (cf. Xenikou & Furnham, 1996) whereas Reynolds (1986) reported test-retest reliabilities ranging from .03 to .81 over a 3- to 4-weeks period.

Study 4: Construct validity: The multitraits-multimethods matrix approach

Campbell and Fiske (1959) recommend that evidence for construct validity be gleaned through an analysis of the patterns of discriminance as well as patterns of convergence between different instruments measuring identical and different traits. Hence, Study 4 was conducted to allow a formal test of this using the Multi-Traits Multi-Methods (MTMM) procedure. Two methods (in this case instruments) tapping similar dimensions (in this case three of the five ECO dimensions) are administered to a single sample. Intercorrelations observed between all scales for all instruments provide critical information about construct validity.

In this study, an organizational values questionnaire, the Focus 93 (De Witte & van Muijen, 1994; van Muijen et al., 1999), was chosen to test the construct validity of the ECO questionnaire. Indeed, values and behavioral patterns are conceptualized as articulated layers of an organizational culture, crossed by consistent dimensions (Rousseau, 1990). Confronting a behavioral pattern questionnaire to a values inventory allows to investigate further this assumption.

Respondents and procedure. In 17 of the 33 companies involved in Study 2, participants received both the ECO questionnaire and the Focus 93 inventory. In total, 340 respondents completed these two questionnaires, for a response rate of 71%. Respondents displayed similar characteristics than those of previous samples, with average age and tenure being 39.9 years and 15.2 years, respectively.

Measures. The Focus 93 (De Witte & van Muijen, 1994; van Muijen et al., 1999) is well grounded in theory (the Competing Values Model [Quinn, 1991]), and has been shown to display good psychometric properties in more than ten different languages (De Witte & van Muijen, 1994; van Muijen et al., 1999). It includes 53 statements measuring organizational climate perceptions and 37 value items. Only the value item set was used in this study. Respondents indicate on a six-point Likert scale to what extent each value is characteristic of their organization. According to its underlying theoretical framework, the Focus 93 is composed of four scales, namely “support”, “rules”, “goals” and “innovation”. These scales include 7 to 10 items with reliabilities ranging from .78 to .91 (see De Witte & van Muijen, 1994). Although the Focus 93 instrument is structured around four factors, recent empirical evidence suggests that a three factor solution, combining "innovation" and "goals", may be more appropriate (Vandenberghe & Peiro, 1999). Therefore, the factor structure of the Focus 93 questionnaire was evaluated first and then inputted into the MTMM analysis.

Results. The Focus 93 analyzed using a principal components analysis, with varimax rotation indeed produced a three-factor solution. The eigenvalues of these factors were 7.88, 6.67, and 3.85, respectively, which accounted for 52.6 % of the total variance (the full factor solution is available upon request). Only items with a loading higher than .40 on a single factor were retained. Using this criterion, the first factor (13 items) corresponded to a “support” dimension. The ECO counterpart to this dimension is "commitment-solidarity". The second factor (11 items) covered a “rules” dimension which finds its exact counterpart in ECO's "control" dimension while the third factor (6 items), as expected, pools the goals and innovation items into the single “goals and innovation” factor. This captures the same domain content as ECO's "innovation-productivity" factor.

The MTMM analysis was performed based on the three-factor solution of the Focus 93 and the three conceptually similar dimensions from the ECO questionnaire. The multitraits-multimethods correlation matrix is presented in Table 4.

Table 4
Study 4: Multitraits-Multimethods Matrix for Common Dimensions of ECO
and FOCUS 93 Questionnaires

Dimension	ECO Questionnaire			FOCUS 93		
	1	2	3	1	2	3
<u>ECO Questionnaire</u>						
1. Commitment-solidarity	(.92)					
2. Rules	.06 (3)	(.79)				
3. Productivity-innovation	.58 (1)	.33 (2)	(.83)			
<u>FOCUS 93</u>						
1. Support	.75	.05	.63	(.92)		
2. Rules	.37 (2)	.66	.50	.43 (3)	(.90)	
3. Goals-innovation	.46 (1)	.30 (3)	.73	.61 (1)	.58 (2)	(.81)

Note. N = 340. Values in boldface in the diagonal correspond to Cronbach's alpha coefficients.

Underlined values represent the validity diagonal. Values in parentheses beside correlations indicate ranks of these correlations in each triangle.

Under MMTM prescriptions (Campbell & Fiske, 1959), convergent validity is estimated from the correlations between the two questionnaires when assessing the same traits. These correlations, the main validity diagonal highlighted in bold in Table 4, are all significantly different from zero and high, ranging from .66 to .75. ECO and the Focus 93 provide highly similar scores on the same dimensions, proving their concurrent validity.

Discriminant validity is assessed by confronting the pattern of correlations to several requirements. Two of the three criteria require that the correlations between Focus 93 and ECO scores of the same dimensions be higher than all correlations between different dimensions. This requirement is fully met by ECO. As shown in Table 4, no coefficient in the entire matrix is larger than the coefficients in the validity diagonal. The last criterion requires that the pattern of traits correlations be

similar throughout the matrix. In practice, this means rank ordering the correlations in each of the triangles of the matrix. In Table 4, these ranks are in parentheses. As may be readily observed, this requirement is fully met in three of the four matrix triangles and is partially met in the lone exception. These results are highly consistent with a demonstration of discriminant validity.

The multitraits-multimethods analysis clearly shows that the variance explained by the traits tapped by ECO exceeds the variance accounted for by the method used. In other words, the ECO questionnaire do capture generic cultural traits manifested both through values and behavioral patterns.

Study 5: Inter-organization variability and consensual validity

It remains now to investigate ECO's ability to detect inter-organization differences as well as intra-organizational homogeneity (consensual validity). Study 5 deals with this issue.

Respondents and procedure. The database used in this study was previously used in Study 2.

Table 5
Study 5: Analyses of Variance for ECO Dimensions

	F	p	η^2
1. Support-gratefulness	9.45	.000	.34
2. Commitment-solidarity	6.11	.000	.25
3. Productivity-innovation	11.44	.000	.39
4. Rules	4.42	.000	.20
5. Continuous learning	5.18	.000	.22

Note. Individual $N = 609$; Organization $N = 33$.

Results. Multivariate analysis of variance (MANOVA) was used to verify inter-organization discrimination. The organization in which the respondent worked was treated as an independent variable while the responses provided to each of the ECO scales were the dependent variables. The multivariate test was significant indicating that ECO scores varied significantly across organizations (Wilks' $\Lambda = .19$, $F_{\text{mult}}(32, 576) = 7.09$, $p < .000$, $\eta^2 = .28$). The eta-squared statistic indicates that more than a quarter of the variance between people detected by ECO is attributable to differences between the organizations. Univariate analyses of variance were conducted for each separate dimension and are reported in Table 5. As can be seen, results indicate that all five dimensions varied significantly across organizations, confirming the high sensitivity of the ECO instrument to inter-organizations variations.

Sheridan (1992) has correctly warned that comparing organizations which belong to different industrial sector confounds organizational and sector level differences. That is, such studies present "the potential problem of confounding variation in organizational culture values with what may be broad industry-wide differences in organizations' strategies and management practices" (Sheridan, 1992, p. 1039). In order to tease out sector from firm variance, MANOVA for nested design was executed to distinct the effect of sectors from the effect of firms inside a given sector on the five ECO's dimensions (Neter, Kutner, Nachtsheim, & Wasserman, 1996). The organizations were grouped as

described above (cf. Study 2). Results indicate that the ECO scales are sensitive to cultural variations among firms within industries (Wilks' $\Lambda = .34$, $F_{\text{mult}}(21, 471) = 5.35$, $p < .000$, $\eta^2 = .19$) as well as between sectors (Wilks' $\Lambda = .55$, $F_{\text{mult}}(4, 471) = 15.32$, $p < .000$, $\eta^2 = .14$). As indicated by eta-squared statistics, the sector's effect on cultural perceptions is lower than the firm within sector's effect.

Consensual validity refers to the similarities of responses for individuals assessing the same cultural context. Since eta is defined as a ratio of between sums of squares to total sums of squares, and since total sums of squares includes within sums of squares, it is sometimes stated that eta is a measure of consensual validity (e.g., Cooke & Rousseau, 1988). By this criterion, ECO produces eta values in the .20 to .39 range (see Table 5). By contrast, average eta values reported by Cooke and Rousseau (1988) and James (1982) are respectively .11 and .13.

However, this interpretation of eta as a measure of homogeneity has been criticized (Glick, 1985; Kozlowski & Hattrup, 1992) as its size is affected by between-group variance. Under current thinking, consensual validity may be established using the $r_{\text{wg}(j)}$ index developed by James, Demaree, and Wolf (1984). This index is a function of two variance indices: (a) the observed variance of members' responses within an organization and (b) the expected variance when responses are assumed to be normally distributed (James et al., 1984). The obtained ratio varies between 0 and 1 and a coefficient of .70 is generally taken to be indicative of good consensual validity (George & Bettenhauser, 1990).

Calculation of the $r_{\text{wg}(j)}$ index for the five ECO dimensions and each of the 33 organizations investigated supported consensual validity of the ECO instrument ($r_{\text{wg}(j)} = .88$ for "recognition-support", .93 for "commitment-solidarity", .91 for "innovation-productivity", .85 for "control", and .63 for "continuous learning"). At slightly less than .70, "continuous learning" does not meet this criterion nearly as well as the other dimensions. On balance, then, ECO produces empirical results which are consistent with expectations of consensual validity as well as has the ability to discriminate organizations and sectors from each other.

Discussion

Articulation between values and behavioral norms

The definition of culture holds as a central tenet that values and behavior patterns or norms are inter-related in a consistent way: norms and patterns of thinking and behaving are manifestations of an underlying value system (Rousseau, 1990). The comprehensive review of current culture inventories described in this article showed that most questionnaires of organizational culture consequently take a value-based or a norms-based perspective. However, the available research evidence shows that values inventories and patterns of behavior questionnaires do not appear to converge in a coherent and predictable manner (Xenikou & Furnham, 1996).

The first major contribution of this study, therefore, is to show strong convergence between similar dimensions measured by a values instrument (Focus93) and by a norms questionnaire (ECO). This provides solid evidence, as implied by the multi-layer conceptualization of organizational culture,

that values and behavioral patterns may well reflect common cultural factors. It would be now advisable to investigate the articulation between values and behavioral patterns from a dynamic point of view, in a longitudinal research design (Hatch, 1993). In the context of cultural change or during an acculturation process, behavioral norms are assumed to be more malleable cultural components than values and would be therefore central levers for managing cultural change. Because of ECO's psychometric properties, this hypothesis becomes testable.

Core cultural dimensions

The review also shows the plethora of dimension labels attached to dimensions measured in culture questionnaires. Although four conceptual domains seem to be common to most cultural questionnaires, all instruments cover them incompletely and most measure numerous other dimensions whose relevance across organizational contexts is questionable. Finally, the convergent and discriminant validity patterns of similar cultural dimensions assessed by different instruments remain to be demonstrated.

ECO appears to cover a sufficient set of distinct reliable cultural dimensions. Devised with a combination of rational and empirical techniques, ECO identifies five fundamental core dimensions of culture: (a) Recognition-support, (b) Commitment-solidarity, (c) Innovation-productivity, (d) Control, and (e) Continuous learning. Clearly, this attempt to identify core dimensions has produced a smaller set of dimensions (5) than is the case over all instruments. This suggests that ECO's concepts are broader, enveloping concepts which are conceptually close yet distinctly measured in other questionnaires.

In comparison with the four conceptual domains presented in Table 1, "Recognition-support", "Commitment-solidarity" and "Continuous learning" cover the people orientation, demonstrating the heterogeneity of this construct. The "Control" dimension corresponds to the control of behavior domain. Innovation and outcomes orientation could not be distinguished in ECO, as in previous studies (Den Hartog et al., 1996; Vandenberghe & Peiro, 1999) and are assessed by the single dimension "Innovation-productivity".

The discriminant validity of ECO dimensions was confirmed, indicating that in spite of correlations between the scales, the different dimensions of culture remain clearly distinguishable from each other. Although this factorial structure needs to be confirmed on other samples, it suggests that people draw a substantial part of their apprehension of their organization's culture from at least three conceptual sources: (a) from the support and recognition systems, (b) from the solidarity they feel with others, and (c) from achievement. All three dimensions are directly related to known managerial concerns and considerably studied by Human Resources specialists (performance management and motivation, team building, and social-cognitive theory, respectively) and all three are directly amenable to intervention.

Finally, probably the most interesting result of this study is the evidence of convergent validity provided by the multi-traits multi-methods analysis conducted with three ECO dimensions ("Recognition-support", "Control", and "Innovation-productivity") and similar dimensions from the Focus 93. Only three of the five factors of ECO were tested. As a pragmatic matter (no other single measure assessing all five dimensions), the convergence-discriminane pattern for ECO's other

dimensions remains to be established. In particular, Tracey, Tannenbaum, and Kavanagh (1995) have validated a continuous learning culture instrument which should correlate with ECO's continuous learning dimension if it is valid.

Psychometric requirements

In spite of the increasing use of culture questionnaires for scientific as well as for managerial purposes, many questionnaires have yet to demonstrate their psychometric properties such as temporal stability, and the level of intra-organizational consensus and inter-organizational distinctions they are capable of producing. Few culture researchers (excepting Chatman & Jehn, 1994; Cooke & Rousseau, 1988) tested the generalizability of their instrument across industries by conducting validity studies on sufficiently large samples of heterogeneous organizations.

ECO demonstrates good general psychometric properties (homogeneity, stability, content and construct validity) as well as strong psychometric properties which are specifically required for culture instruments: inter-organizational discrimination and consensual validity. These psychometric indices are not generally available with other instruments.

To conclude with, this paper constitutes a first step toward identifying a set of relevant and reliable cultural dimensions characterizing organizations. The construct validity of this set of generic dimensions need to be further investigated by means of confirmatory factor analysis and additional applications of the multitrait-multimethod approach.

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Footnotes

¹ Mean correlations between sub-scales from the same instrument were .62 for the Corporate Culture Survey, .46 for the Organizational Beliefs Questionnaire, .54 for the Organizational Culture Inventory and .69 for the Culture Gap Survey. The mean correlation for similar scales from different instruments was .51.

² As the study was being conducted in a French-speaking context (Belgium), items were formulated in French.

³ Xenikou and Furnham (1996)'s data displayed alphas ranging from .60 to .95 for the Organizational Culture Inventory, from .60 to .86 for the Culture Gap Survey, from .35 to .78 for the Organizational Beliefs Questionnaire, and from .55 to .77 for the Corporate Culture Survey.

⁴ Xenikou and Furnham (1996)'s data reveals coefficients of variability ranging from .16 to .23 for the Organizational Culture Inventory, from .14 to .23 for the Organizational Beliefs Questionnaire, from .19 to .23 for the Corporate Culture Survey, and from .28 to .55 for the Culture Gap Survey.

⁵ The average intercorrelation was .22 for the scales of the Organizational Culture Profile, .54 for the Organizational Culture Inventory, and .69 for the Culture Gap Survey (Xenikou & Furnham, 1996). They ranged from .31 to .81 for questionnaires based on the Competing Values Model (Den Hartog et al., 1996; Quinn & Spreitzer, 1991).