

COGNITIVE STYLE AND THE INTERPRETATION OF ORGANISATIONAL CHANGE

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ABSTRACT

The ability of individuals to interpret change is considered to be a criterion for successful organisational change. Accordingly the influence of a specific intra-individual variable, i.e. cognitive style (field dependence and independence) on the sensitivity to identify change needs, was assessed. For this purpose the Organisational Change Interpretation Scale (OCIS) was constructed. The OCIS in conjunction with the Hidden Figures Test, a measure of field independence, and the Field Dependence Questionnaire, a measure of field dependence, were administered to 307 managers within 14 industries. It was found that the cognitive restructuring process as measured by the Hidden Figures Test, explains 72% of the variance of the interpretation of change, as measured by the OCIS. It was concluded that the OCIS could be utilised as a selection instrument for the identification of change agents.

OPSOMMING

Die vermoë van individue om verandering te interpreteer, kan as kriterium vir suksesvolle organisasie verandering beskou word. Op grond hiervan is die invloed van 'n spesifieke intra-individuele veranderlike, naamlik kognitiewe styl (veldafhanklikheid en -onafhanklikheid) op die sensitiwiteit vir die identifisering van veranderingsbehoefes, ondersoek. Vir hierdie doel is die Organisasie Verandering Interpretasieskaal (OVIS) gekonstrueer. Die OVIS is in samehang met die Versteekte Figure Toets as meting van veldonafhanklikheid, en die Veldafhanklikheidsvraelys as meting van veldafhanklikheid, op 307 bestuurders in 14 industrieë geadmistreer. Daar is bevind dat die kognitiewe herstruktureringproses, soos gemeet deur die Versteekte Figure Toets, 72% van die variansie in die interpretasie van verandering, soos gemeet deur die OVIS, verklaar. Die afleiding word gemaak dat die OVIS onder andere nuttig as keuringsinstrument ter identifisering van veranderingsagente gebruik kan word.

The ability of organisations to initiate and implement the correct type of change in order to take advantage of changing markets, industries and technologies is regarded as one of the key competencies of world class organisations. The concepts *initiate* and *implement* show that change can be planned in a structured way. Given this reality there are still many change efforts that remain unsuccessful and fail to create a competitive advantage. The identification of criteria for successful organisational change is therefore regarded as a strategic prerequisite within the context of planned change. During this identification process it is necessary to assess the intra-individual variables that influence the change process. Cognitive style, as one of these variables, could have an influence on the individuals' sensitivity to see the need to change. A key question arises: Will change have a more strategic impact if *individuals* with specific cognitive styles are used instrumentally in the identification of change needs?

FIRST- AND SECOND-ORDER CHANGE

From organisational behaviour theory it is clear that planned change has various triggers. Nadler (1987, p. 198) states in this regard that "... *repositioning may be forced by sudden unexpected environmental shifts, it may be planned in anticipation of environmental moves; or it may be calculated to precipitate movement in the environment.*" This quote and additional literature (Hamel & Prahalad, 1994; Levy, 1986; Mirvis, 1990) suggest that change is initiated either by planning in accordance with future environmental changes, or is implemented as a reaction to environmental change that has already taken place. Environmental change as used in this context refers to the environment internal and external to the organisation. According to Spicer (1989) organisations can implement one of three strategies as a reaction to the above-mentioned triggers:

- (i) **Regression:** Resistance against change. Current values and behaviour remain.
- (ii) **First-order change:** Effort to change current mechanisms by doing more of the same.
- (iii) **Second-order change:** A paradigm shift. New values and behaviour are accepted.

It is assumed that regression will not lead to the survival or

success of organisations and that both first- and second-order change are viable options in change situations. These options will then constitute a framework for discussion regarding organisational change and will subsequently form a basis for the development of an instrument to measure the interpretation of change. A further discussion of the theory pertaining to these concepts is therefore justified.

A paradigm shift is described by Bartunek and Louis (1988) as second-order change, while incremental modifications and improvements in current, accepted frameworks are seen as first-order change. The following definition makes the difference clear "... the major difference between first- and second-order organisational change is whether or not a particular framework for understanding is altered ..." (Bartunek & Louis, 1988, p. 101). The concept *paradigm* can in this context be defined as a specific frame of reference (Bartunek & Louis, 1988, p. 100); "... a state of thinking and acting" (Levy, 1986, p. 11) and patterns of cognitive processing (Smircich & Stubbart, 1985). Watzlawick, Weakland and Fish (1977) also identify differences between first- and second-order change. First-order change is defined here as a variation in a given system itself. Greiner (1972) identifies two levels of change: evolutionary and revolutionary change. Evolutionary change is described as incremental shifts within a current management pattern, while revolutionary change is characterised by the discontinuation of previous management practices and a search for new practices that will form the foundation of management in the following period of evolutionary growth. Davis (1982) describes different levels of change and refers to incremental change as a change in *content*, while transformation is defined as a change in *context*.

Porras and Silvers (1991, pp. 51-78) attempt to integrate these change concepts in a *model of planned change*. In this summarising model two forms of change are compared (see Table 1). Given the context of cognitive change in Table 1 it is important to note that gamma B change represents the replacement of one paradigm with another, while mere adjustments within the same paradigm are indicated by alpha, beta and gamma A change (Golembiewski, Billingsley & Yeager, 1976, p. 135).

TABLE 1
ORGANISATIONAL DEVELOPMENT VERSUS ORGANISATIONAL TRANSFORMATION
(Adapted from Porras and Silvers, 1991, pp. 54-58)

Organisational development (First order change)	Organisational transformation (Second order change)
<ol style="list-style-type: none"> 1. A set of behavioural theories, values, strategies and techniques 2. Focused on planned change of work systems 3. With the intention to accomplish alpha, beta and gamma A cognitive change 4. Change to create a better fit 5. Focus on the current environment 	<ol style="list-style-type: none"> 1. A set of behavioural theories, values, strategies and techniques 2. Focused on planned change of vision 3. With the intention to accomplish alpha, beta, Gamma A and B cognitive change 4. Change to create a paradigm shift 5. Creates future environment

It is important to note that the types of change discussed above should not be considered as mutually exclusive (Bartunek & Louis, 1988). Second-order change should therefore not be seen as the "best" type of change. An organisation that is in a state of equilibrium (see Gersick, 1991) requires only incremental change. If a second-order change effort is implemented in this situation, it is likely to fail (Davis, 1982; Martel, 1986; and Mirvis, 1990). Furthermore, attention should be drawn to the fact that a complete change effort will include both first- and second-order change (Human & Horwitz, 1992).

It can be concluded that first- and second order change is characterised by different elements. A summary of these elements is presented in Table 2.

INDIVIDUAL DIFFERENCES IN THE INTERPRETATION OF CHANGE: THE ROLE OF COGNITIVE STYLE

In any study of change the human dimension must be considered. It is widely accepted that individuals influence the change process. *Do these individuals that initiate and implement change display differences regarding their particular cognitive style?*

The interpretative psychology contains some answers to the preceding question. Previous studies (Bantel & Jackson, 1989; Murray, 1989; Norburn & Birley, 1988; Udiksen, 1992; Wiersma & Bantel, 1992) highlight the fact that strategic decisions (of which change is one) reflect the characteristics of the top management team. Sparrow (1994, p. 152) states that "strategic decision-making is underpinned by the cognitive base of a managers' perceptual process". Individuals therefore use an interpretative process to make sense of a change scenario, and this interpretative process then directs organised behaviour (Smircich & Stubbart, 1985). If the change initiated is influenced by the *interpretation of the change scenario*, and this interpretation is directed via a *cognitive base*, different cognitive styles may be used instrumentally in the change process, i.e. individuals with certain cognitive styles may be sensitive to the organisational change need, whilst others may not see the need to change.

Cognitive style is a hypothetical construct that was developed to explain the interaction process between stimuli (the change scenario) and a response (interpretation of change). This interaction process includes perception and interpretation, attention, memory, concept formation, problem solving and social cognition (Sparrow, 1994). The constant individual

TABLE 2
CHARACTERISTICS, CONTENT AND PROCESSES OF FIRST- AND SECOND-ORDER CHANGE
(Adapted from Levy, 1986. p. 11 and Porras & Silvers, pp. 51-78)

First-order change	Second-order change
<p>Characteristic</p> <ul style="list-style-type: none"> • Incremental change • Quantitative change • Change within a paradigm • Continuity = development in the same direction • Change in content • Homeostasis • Variation of a current state <p>Content</p> <ul style="list-style-type: none"> • One or a few organisational components • One or a few levels (individual or group level) • One or a few behavioural aspects • Work processes • Social factors • Technology • Physical work layout <p>Processes</p> <ul style="list-style-type: none"> • Quality circles • Profit-sharing • Work processes • Social factors • Technology 	<ul style="list-style-type: none"> • Revolutionary change • Qualitative change • Change that creates a new paradigm • Discontinuity, new directions • Change in context • Radical change • Restructuring of frame of reference <ul style="list-style-type: none"> • Multidimensional, multi-component change • Multi level (individual, group and organisation) • All values, norms, attitudes, attributes, perceptions, worldviews and behaviour • Vision • Principles of the organisation • Mission • Core business • Status quo <ul style="list-style-type: none"> • Recontextualization ("reframing") • Consciousness raising (the process of transformation is made visible) • Raising of the system's ability to analyse current paradigms • Envisioning • Normative incrementalism

differences in the above-mentioned processes are known as cognitive styles (Messick, 1976). Various definitions of cognitive style can be found in the literature. Vernon (1973, p. 141) defines cognitive style as a construct that is involved in cognitive processes and is responsible for individual differences in a collection of cognitive-, perceptual- and personality variables. A definition by Pratt (1980, p. 502) describes cognitive style as the method the individual uses to assimilate, understand and transfer information. Saracho (1986) is of the opinion that cognitive style is a psychological construct that includes elements such as perceptual style, personality, intelligence and social behaviour.

From the above definitions it can be said that the *way* in which processes are approached constitute the core of the concept "cognitive style". There is therefore no focus on the *ability* of the individual. It is thus important to note that cognitive style differs from cognitive ability, since (i) ability emphasises the *what* of cognition and style the *how* (McKenna, 1984), (ii) cognitive style is free from value-judgement, but cognitive ability distinguishes between above and below average (Messick, 1976), and (iii) cognitive style has a broader field of application than cognitive ability (Witkin, 1976).

Different cognitive styles can be found, i.e. field dependence-independence, reflectivity-impulsivity, categorisation, tolerance for ambiguity, cognitive complexity and automatization-restructuring (Bostic & Tallent-Runnels, 1991). Of all these cognitive styles, the field dependence-independence construct as conceptualised by Witkin, has been the most widely researched style to date (Kogan, 1976; Vernon, 1973; Witkin & Goodenough, 1981). Most research pertaining to field dependence-independence was conducted between 1940 and 1980, literature referred to will therefore date from this time period. An attempt is also made to use this well researched construct in a new context.

Empirical findings that lead to the development of the comprehensive field dependence-independence theory were originally based on perceptual research. This research made use of the perceptual tests of orientation, i.e. (i) Rod- and frame test of Witkin; (ii) The Tilting room-tilting chair test, that consists of the room orientation test, the body orientation test and the blindfolded body orientation test (Scheper, 1975); and the (iii) Rotating room test. In these tests the individual uses either internal kinaesthetic energy or visual information during orientation regarding the vertical position. Persons that make use of internal kinaesthetic information rather than misleading visual information, can be regarded as being field independent. In contrast to this, persons that focus on misleading visual information are considered to be field dependent (Janse van Rensburg, 1989). Witkin (1949, p. 170) derived the following definition for the field dependence-independence construct from his research "a bipolar personality dimension that assesses the individual's tendency to rely on the visual field or the body itself as a source of cues for locating the upright."

The Hidden Figures Test (HFT) was developed with further research. Witkin was of the opinion that both perceptual ability tests and the HFT tested the ability to identify an item in an organised field (Parisnis & Long, 1979). It was found that a

field independent person operated in a more analytical way during the restructuring tasks of the HFT, while the field dependent person approached tasks in a global manner (Witkin & Goodenough, 1981). These findings led to field dependence-independence being described as a perceptual-analytical ability.

It was further found that this perceptual-analytical ability could be utilised in other problem situations that require analysis and synthesis (Faterson, 1962). The restructuring ability was here, for the first time, linked to intellectual functioning and cognitive style (Linn & Kyllonen, 1981). This expanded dimension of individual differences gave rise to the development of the *psychological differentiation* theory. Two differentiation models, i.e. the 1962- and the 1979-Models of Witkin, Goodenough and Oltman represent the foundation of this theory. According to the 1979-Model of Differentiation (Witkin, Goodenough & Oltman, 1979) psychological differentiation is divided into three categories of segregation, of which the segregation of the self and the non-self is noteworthy for the current research. This category of segregation is divided into *cognitive restructuring and interpersonal skills*.

From the psychological differentiation theory it can be inferred that field independent individuals tend to develop cognitive restructuring skills, while field dependent individuals have stronger interpersonal skills (Witkin, et al., 1979). Within the context of psychological differentiation the latter construct is defined as a derivative of the relationship between the self and others (Janse van Rensburg, 1989). Cognitive restructuring is defined as the ability to (i) divide an organised field into basic elements, (ii) to give structure to ambiguous stimuli, and (iii) to see a different structure in a field as the one supplied by the original stimulus (Frank & Noble, 1985). Linn and Kyllonen (1981, p. 268) present the following description of cognitive restructuring: "The ability to disembed relevant information in complex situations."

In the factor analytical literature similarities can be found between the preceding definition of cognitive restructuring and the description of the concept "visualisation" (GV). Horn and Cattell (1966, p. 254) formulated the following definition of visualisation (GV): "The process of imagining the way objects may change as they move through space ... finding Gestalt among the disparate parts of a visual field and maintaining a flexibility concerning other possible structuring of elements in space." Linn and Kyllonen (1981, p. 268) states that cognitive restructuring has a high correlation with fluid intelligence. It can be inferred that the ability to visualise forms the basis of a strategic orientation, which, in turn, may relate to second-order organisational change.

In conclusion it can be said that by linking field independence with cognitive restructuring, and accordingly field dependence with interpersonal skills, the construct of field dependence-independence was associated with cognitive style. Both constructs are free from value-judgements. It is from this departure point that the influence of cognitive style on the interpretation of change scenarios will be researched. Given the aforementioned and preceding theory some similarities between change and field dependence-independence is presented (see Table 3).

TABLE 3
SIMILARITIES BETWEEN COGNITIVE STYLE AND CHANGE

Type of change	Cognitive style
Second order change	Field independence
<ul style="list-style-type: none"> • Restructuring of realities • Change at all levels, dimensions, vision, mission and behavioural aspects • Increase in the analytical ability of the organisation 	<ul style="list-style-type: none"> • Cognitive restructuring • Creates a different structure in a field as suggested by the original stimuli • Analytical thinkers
First order change	Field dependence
<ul style="list-style-type: none"> • Change within current reality • Use group processes during implementation 	<ul style="list-style-type: none"> • Global thinkers (cannot restructure fields) • High interpersonal abilities

THE LINK BETWEEN COGNITIVE STYLE AND THE INTERPRETATION OF CHANGE

The link between field dependence-independence and the interpretation of change scenarios has not yet been researched. A need therefore exists for research in this area. It is important to note that a substantial amount of research in the separate fields i.e. field dependence-independence and organisational change has been conducted.

Research in the area of field dependence-independence can be divided into two main groups: (i) the determinants of the construct and (ii) the impact of the construct. Determinants of field dependence-independence can further be divided into *socio-cultural* research (Berry, 1991; Hansen, 1992; Saracho, 1989; Van Meel, 1991), *biophysical development* (Boverman, Kobayahi & Vogel, 1968; Kogan & Block, 1991; Wapner & Demick, 1991; Witkin, Moore, Goodenough & Cox, 1977) and *gender differences* (Kogan, 1976; Maccoby & Jacklin, 1974; Vernon, 1972). With reference to the impact of the construct, it has been found that field dependence-independence has an influence on *social behaviour* (Coates, Lard & Jakobovics, 1975; Dreyer, 1991; Erez, 1980; Farley, 1974; Loveless, 1972; Witkin & Goodenough, 1977) and on the degree of development and use of *cognitive restructuring* (Bostic & Tallent-Runnels, 1991; Frank & Noble, 1985; Linn & Kyllonen, 1981; McKenna, 1984; Walsh, 1978).

Theory testing research has also been conducted (O'Hara, 1985; Santostefano, 1991; Wachtel, 1972). The research of O'Hara (1985) is of importance to the current study. Her research found that field dependence-independence are not necessarily *bipolar constructs*, but because of the orthogonal relationship, can be considered as separate constructs. (Compare Witkin's (1949) definition as previously stated). Measurement in the current study will be based on this finding.

A number of studies (searches revealed a number in excess of 3 000) have been conducted in the area of organisational change, and therefore only relevant and most recent studies will be cited. These studies resort under the following major categories: The *influence of top management on change* (Ekvall, 1991; Farcey, 1993; Gronhaug & Lines, 1995; Reynierse & Harker, 1995; Sagie, Elizur & Koslowsky, 1995; Shield & Milks, 1994; Spender & Grinyer, 1995; Waller, Huber & Glick, 1995; White, Tansey & Smith, 1994) and the *nature of change processes* (Armenakis, Harris & Mossholder, 1993; Bjorkman, 1989; Bloom & Sheerer, 1992; Dunphy & Stace, 1993; Khan, 1993; Kleiner & Carrigan, 1989; Leifer, 1989; Poole, Gioia & Gray, 1989).

Some studies, of which three will be discussed briefly, did assess linkages between cognition and change. Lau and Woodman (1995) tested the understanding of change of 305 students and 15 members of staff at a University's Human Resource Department and found that change is a result of the cognitive understanding of the change scenario. Lowstedt's (1993) research covered the cognitive approach to the analysis of change. In this specific study the implementation of computer technology in three Swedish organisations was considered to be the change driver. A relationship was found between the thoughts of the decision-makers regarding the change and the actual implemented change. The conclusion of the study is that human cognitive structures would have an influence on the implemented change in organisations. Unfortunately this study does not link a specific cognitive style with a specific change response. Marshak (1993) found that the way in which change is conceptualised is a function of the individual's understanding, or metaphoric system, of the change situation. The aforementioned studies do not give an indication of the nature of the cognitive process that is used during organisational change efforts.

From the research discussed above it can be concluded that:

- (i) Individuals (usually top management) will *initiate* change

- (ii) *Change* initiated is influenced by *intra-individual* variables
- (iii) Individuals, according to field dependence-independence, differ in terms of their *social and cognitive skills*.

The theory and research discussed above highlight the fact that the interpretation of change plays a key role in the success of organisational change. Given this role a need exists to develop an instrument that measures this construct. For the purpose of this study the interpretation of change will constitute two major elements:

- (i) Sensitivity/awareness of the need for change, and
- (ii) An understanding of the focus areas of change.

The research problem can accordingly be formulated by questioning whether measurements of field dependence-independence can be used to assess whether an individual's interpretation of change scenarios will differ. The concept "differ" here refers to the interpretation of different types of change as well as differences in the ability to interpret change.

In the context of the research problem, the current study has the following objectives:

- (i) to construct an instrument that measures the interpretation of change,
- (ii) to identify the dimensions of field dependence and accordingly assess which dimensions would influence the interpretation of change, and
- (iii) to assess the relationship between cognitive style and the interpretation of change.

Given these research objectives the following hypothesis can be formulated.

- H1: A statistically significant relationship exists between cognitive style and the interpretation of change.
If the Organisational Change Interpretation Scale is multi-dimensional, then the following hypotheses can be formulated:
- H2: There is a statistically significant positive relationship between field independence and the interpretation of second-order change.
- H3: There is a statistically significant positive relationship between field dependence and the interpretation of first order change.

METHOD

Sample

The universe was identified as junior-, middle-, senior- and executive management in organisations that are currently implementing change. From this universe a sample of 307 managers were drawn randomly. The sample is representative of all levels of management. Managers from various industries were tested on specific days with the assumption that individuals will be absent in a random way.

The sample consists of 201 men and 106 women, of which 12 are executive, 37 senior, 104 middle and 154 junior management. Managers are representative of the following 14 industries: mining, metals and minerals, financial services, hotels and leisure, construction, chemistry, textile, electronics, engineering, food, printing, steel, transport and energy. The average age of the participants is 35,38 years. Race composition of the sample is representative of Asian, Black, Coloured and White. A summary of the biographical composition of the sample is provided in Table 4.

Instruments

Given the research objectives and the hypothesis of the current study, the following instruments were chosen for the operationalisation of the variables.

The **Hidden Figures Test** (Cf-1) that was constructed by the

TABLE 4
BIOGRAPHICAL COMPOSITION OF THE SAMPLE

Biographical variable:	N	%
Gender:		
Male	201	65
Female	106	35
Total	307	100
Race:		
Asian	14	4,6
Black	61	19,9
Coloured	12	3,9
White	220	71,6
Total	307	100
Level of Management:		
Executive	12	3,9
Senior	37	12,1
Middle	104	33,9
Junior	154	50,1
Total	307	100
Years of Managerial experience:		
3 – 5 years	193	62,9
5 – 8 years	54	17,6
8+years	60	19,5
Total	307	100
Age	$\bar{X}=35,38$	

Educational Testing Service at Princeton, New Jersey, will be used to measure the independent variable, field independence. This instrument forms part of a range of cognitive tests in the Kit of Factor Reference Cognitive Tests. A licence was obtained from the publishers to use only the Hidden Figures Test (HFT) for research purposes.

The HFT consists of 32 items that is divided in two parts of 16 items each. Twelve minutes are allowed for the completion of each part. Each item contains a complex figure in which one of five simple figures, labelled A, B, C, D and E, are hidden. The participant then marks the identified figure's code on the answer sheet. According to Goodenough, Oltman, Snow, Cox and Markowitz (1991) a participant engages in the following process when a hidden figure is identified: (i) encoding, (ii) comparison, (iii) restructuring and (iv) verifying. This process is similar to the characteristics of second-order change (see Table 3). This instrument was chosen on the basis of these similarities and characteristics, to identify *field independent* individuals. The reliability of the instrument for a norm group of grade 11 and 12 students, of which 300 were male and 329 female, is 0,82 for the males and 0,80 for the females (Ekstrom, French, Harman & Dermen, 1976).

The **Field Dependence Questionnaire (FDQ)** was specifically chosen for this study because, in accordance with previous research as referred to in the literature study, it is a good measurement of field dependence as an independent variable. The instrument measures specific constructs of the 1979-Model of Differentiation. These constructs are of importance to the current study because of the striking similarities between these characteristics and that of first-order change (see Table 3). The construction of the items were mainly based, with permission of the author, on the test items of Janse van Rensburg (1989). The FDQ as constructed by Janse van Rensburg contains 120 items and has a reliability of 0,86 according to Kuder-Richardson formula 20. Janse van Rensburg's items were based on O'Hara's scale of social adroitness. After item analysis the items in O'Hara's scale obtained a reliability of 0,88 according to Kuder-Richardson formula 20. Both O'Hara (1985) and Janse van Rensburg's (1989) instruments consist of test items that describe a person

A and a person B. The participant is then allowed only one choice per item and has to identify with either person A or person B. Given that the participants are forced to choose between person A and person B, it is assumed that the personality characteristics of both persons A and B are on the same continuum.

The questionnaire that is used in this research consists of 100 items that are based on a seven-point intensity scale. The FDQ was adapted for the current study to the extent that all the items are in question format. The focus is therefore on the evaluation of each item and not on a forced choice between two imaginary extremes (persons A and B). The reliability of the instrument according to Cronbach's coefficient alpha is 0,89 and 0,80 for the two scales that will be used as a measurement of field dependence. (A discussion of the analysis of the instrument is presented in the following section).

The **Organisational Change Interpretation Scale (OCIS)** is a self-constructed scale that measures the interpretation of change, the dependent variable. The scale consists of 35 change scenarios with two responses each. Both responses are evaluated on a seven-point scale according to the appropriateness of the type of change response to the change scenario. Change scenarios can be divided into the following segments: (i) change within the functional areas within an organisation; (ii) change scenarios within certain phases of organisational development; (iii) change drivers that evoke certain change responses. The change scenarios in the OCIS are divided into groups of change drivers (option (iii) above). These change drivers are representative of the following: (i) economic conditions, (ii) legal governance, (iii) technology, (iv) markets/competitiveness, and (v) a move towards the learning organisation. The specific change drivers influence the following interest groups (i) labour, (ii) management, (iii) unions, and (iv) society at large. All scenarios included in the OCIS are extremely relevant to the South African context.

Two change responses are given for each scenario. These responses are representative of the characteristics and content of first- and second-order change (see Table 2). A complete

TABLE 5
THEORETICAL FOUNDATION OF REPRESENTATIVE ITEMS OF THE OCIS

Scenario:	
Employee morale is low after a recent take over. The morale problem is influencing productivity and client services.	
First order change	Second order change
Characteristics	
(a) Incremental change Addresses symptoms of the problem, i.e. morale	(b) Change in thinking (reframing)
Content	
Quality of life (uni-dimensional)	Multiple behavioural aspects (thoughts, attitudes, recontextualization, etc).
Scenario:	
The markets that your organisation are currently targeting are becoming less viable due to competitors that operate in the same market with higher quality products/services.	
First order change	Second order change
Characteristics	
(a) Change of content	(b) Change in context
Content	
Single component – everything in the organisation remains the same; only the target market changes	Multidimensional: core business – New skills – New product – New marketing
Scenario:	
During your bi-annual visit to all service outlets, you found that some members of the management team felt that they did not have enough authority to make decisions autonomously.	
First order change	Second order change
Characteristics	
(a) Continuity. Still no authority	(b) Discontinuity. Authority broader than just management
Content	
Organisational process (communication) – Information available – Only symptoms of problem are addressed	Values Multilevel (empower all organisational members)

change process, of which *envisioning, mobilisation, institutionalisation and stabilisation* for second-order change, as well as *exploration, diagnosis, planning, action and integration* for first-order change, is included in each response. The theoretical foundation for a few representative items are presented in Table 5. The reliability of the scale according to Cronbach's coefficient alpha is 0,97. A complete analysis will be presented in the results section.

The purpose of the study is not to assess the correctness of the change responses, but rather to focus on the individual's interpretation of the change scenario. The fit of a change response with a change scenario is therefore of no importance. Given that the study's core interest is in the *interpretation* of first- and second-order change, the change scenarios are generic and representative of change drivers. There are therefore no correct answers, but the participant's interpretation in terms of the first- and/or second-order nature of the change is of paramount importance.

The HFT, OCIS and the FDQ were administered, in the sequence mentioned here, by the researcher or by a registered psychometrist in organisations that participated on a voluntary bases. The testing time for each manager was approximately one and a half hours and the managers were tested in groups of between five and 15. Anonymity was protected throughout the testing process.

RESULTS

Organisational Change Interpretation Scale (OCIS)

A statistical analysis was conducted on the results of the 70 items (35 with two responses each). The 70 items were intercorrelated (using the Principal Component Analysis (PCA) of the BMDP) and subjected to a factor analysis (utilising the Principal Factor Analysis programme (PFA)). Given that the intercorrelation matrix is of magnitude 70 × 70 it will not be reproduced in this article. In the first-order factor analysis 14 factors were postulated. Two of the first-order factors attracted a large number of items. Factor 1 with 22 items, and a reliability of 0,96 according to Cronbach's coefficient alpha, appears to be, from a theoretical viewpoint, representative of the interpretation of second-order change. The 23 items of Factor 2 can be identified as the interpretation of first-order change and has a reliability of 0,94 according to the coefficient alpha. The correlation between Factor 1 and Factor 2 is 0,77. These factors can therefore not be considered as separate constructs.

One of the factors in the first-order factor analysis had no meaningful loadings and was not included in the second-order factor analysis. Subscores were calculated and intercorrelated for the remaining 13 factors. The factor matrix was rotated via the Direct Oblimin procedure (BMDP4M) and rotated factor loadings were calculated (see Table 6).

TABLE 6
ROTATED FACTOR MATRIX OF THE OCIS

	Factor I	Factor II	Factor III
HFT1	0,716	-0,161	-0,206
HFT2	-0,459	0,456	0,113
HFT3	0,676	-0,036	0,151
HFT4	-0,602	0,037	0,033
HFT5	0,020	0,484	0,056
HFT6	-0,743	0,030	-0,133
HFT7	-0,062	0,159	0,666
HFT8	0,267	-0,074	-0,026
HFT10	-0,257	-0,160	0,257
HFT11	0,615	0,184	-0,204
HFT12	-0,063	0,682	-0,094
HFT13	0,256	0,020	-0,151
HFT14	0,018	-0,245	-0,149

Factor III attracted too few items to generate a reliable scale. Factor II had only six items with very low reliability. Only one factor with 62 items that measure one dimension was therefore accepted. Scale I that was identified as the interpretation of change, was subjected to an item analysis (using the NP50 programme of the NIPR). All 62 items were included in order to determine which items would be rejected via the iterative process. The indices of reliability (r_{gs}) range from 0,694 to 1,533. After seven iterations eight items, namely 3a, 11b, 15b, 19a, 23b, 27b, 34a and 34b were rejected, resulting in a 54 item scale. The OCIS has a reliability of 0,97 according to Cronbach's coefficient alpha.

Field Dependence Questionnaire (FDQ)

The 100 items of the FDQ were intercorrelated and subjected to factor analysis. The same procedure that was used in the analysis of the OCIS was followed. In this process nine second-order factors were postulated. From the intercorrelation matrix it can be inferred that the nine second-order factors are independent from one another. The highest intercorrelation is -0,31 between Factor II and Factor IV. Five of the nine factors had extremely low loadings and was not included. The final instrument therefore consists of four scales as indicated in Table 7.

TABLE 7
Identification of the field dependence scales

Scale	Cronbach's coefficient alpha	Content of the Scale
Scale I	0,78	Sensitivity
Scale II	0,89	Social adroitness
Scale III	0,80	Interpersonal affect
Scale IV	0,79	Introversiion-Extraversiion

The NP50 programme was used to conduct item analysis for Scale I through to Scale IV. For Scale I (Sensitivity) the indices of reliability range between 0,477 and 1,1106. None of the 15 items were rejected during the iterative process. Scale I has an alpha coefficient reliability of 0,78. Scale II (Social adroitness) originally consisted of 21 items. After nine iterations 18 items, with indices of reliability that range between 0,638 and 1,100, were accepted. The reliability coefficient of Scale II is 0,89 according to Cronbach's coefficient alpha. Scale III (Interpersonal affect) was subjected to five iterations during which five items were rejected and 16 accepted. The average index of reliability of the 16 items is 0,683 with a standard deviation of 0,121. The Cronbach alpha reliability coefficient of the Scale is 0,80. None of Scale IV's (Introversiion-Extraversiion) items were rejected during the iterative process. This Scale consists of 13 items with indices of reliability that range between 0,553 and 1,080. The alpha reliability coefficient of Scale IV is 0,79. From a theoretical viewpoint it can be inferred that Scale II and Scale IV are representative measurements of field dependence.

Multiple Regression Analysis

Given the fact that the OCIS measures only one construct, both a stepwise and a multiple regression analysis were conducted to assess the relationship between cognitive style and the interpretation of change. The scores on the HFT as well as all four scales of the FDQ were used as independent variables. The dependent variable was Scale I of the OCIS. The results of the regression analysis, as per the stepwise regression, appear in Table 8.

TABLE 8
MULTIPLE REGRESSION ANALYSIS

Stepwise regression	: Dependent variable (interpretation of change)
Multiple R	: 0,8507
R ²	: 0,7238
Standard Error	: 34,2118

Analysis of Variance

Source of variance	Df	Sum of squares	Mean Square
Regression	2	932 320,94	466 160,42
Residual	304	355 816,2190	1170,4481

F=398,275; p(F) < 0,0001

Variables in the equation

Independent Variables	B	SE B	Beta	t-value	P
Hidden Figures Tests	7,7123	0,2818	0,84	27,37	0,00
Introversiion-Extraversiion	0,3901	0,1839	0,06	2,12	0,03
Constant	137,15251				

Table 8 indicates that only two predictor variables (HFT and introversiion-extraversiion) were included in the regression equation. It was found that scores on the HFT explains 71,97% of the variance of the interpretation of change. Scale IV (Introversiion-extraversiion) was subsequently included in the stepwise regression. An additional 0,41% of the variance was explained by this scale. In contrast to this Scale III (Interpersonal affect) was included in the multiple regression analysis. According to the multiple regression analysis the HFT and Scale III jointly explains 72,85% of the variance in the interpretation of change. Based on rational and theoretical principles it was decided to accept Scale IV in the regression equation.

According to the stepwise regression the HFT and Scale IV explains 72,38% of the variance in the interpretation of change (see Table 8). The final multiple correlation is 0,85 and the standard error of estimate is 34,21. From the analysis of variance it is evident that the linear regression accounts for a statistically significant proportion of the total variance, with F(2,304)=398,275, p<0,0001.

An estimated value of the interpretation of change can be calculated by using the following regression equation:

$$Y_{OCIS} = 7,7123X_1 + 3,3901X_2 + 137,15251$$

Where X_1 = score on the HFT, and X_2 = Score on Scale IV of the FDQ.

The standardised regression coefficients (Beta Coefficients) show that the HFT carries a greater weight than the other predictor, introversiion-extraversiion, in the equation.

DISCUSSION

From the findings it is clear that the first research objective of the study was achieved, in that a reliable instrument that measures the interpretation of change was constructed. The uni-dimensionality of the scale is an indication that the process that is involved in the interpretation of both first- and second-order change (Scale I) is the same. A high score on this

scale is therefore an indication of an individual's sensitivity to identify change needs within complex change scenarios.

In achieving the second objective of the study it was found that the FDQ consists of mainly four dimensions, being social adroitness, interpersonal affect, introversion- extraversion and sensitivity. These dimensions are aligned with the 1979-Model of Differentiation's description of a field-dependent individual (see Table 1). According to this Model the field-dependent individual does not function independently of an external frame of reference and therefore develops interpersonal skills rather than cognitive restructuring skills (Witkin et al., 1979). All four scales of the FDQ relate to the description of interpersonal skills in the literature and therefore support the findings of the 1979-Model (Janse van Rensburg, 1989; O'Hara, 1985; Witkin, et al., 1979).

The relationship between field independence and the interpretation of second-order change on the one hand and field dependence and the interpretation of first-order change on the other hand, could not be assessed. Hypothesis 2 and 3 could therefore not be tested. The reason for this being the unidimensionality of Scale I of the OCIS. This fact again suggests that a similar interpretative process is involved in both types of change.

The core research question pertaining to the relationship between cognitive style and the interpretation of change was successfully answered, the third research objective was therefore attained. From the stepwise regression analysis it can be inferred that scores on the HFT and Scale IV (introversion-extraversion) of the FDQ, explains 72,38% of the variance in the interpretation of change. A significant multiple correlation was found in support of Hypothesis 1. The HFT alone explains 71,97% of the variance on the OCIS. A unique relationship of a verbal measurement (by means of a questionnaire) and a non-verbal measurement of field independence (via the identification of a hidden figure) was therefore found.

Given the uni-dimensionality of the interpretation of change and the exceptionally high percentage of common variance it can be inferred that these two scales measure a similar cognitive process. *Based upon this finding the cognitive process that is used during the interpretation of change can be identified. It can therefore be stated that the cognitive process that is involved during the interpretation of change includes (i) encoding, (ii) comparison, (iii) restructuring and (iv) verifying.* The manager in the changing organisation will therefore form a cognitive image of the way in which the organisation should function in the future, given space and time, in order to create a competitive advantage (encoding). This cognitive image will then be compared to the current organisational reality and market conditions (comparison). Given a discrepancy in the comparison, restructuring will take place (restructuring). Specific spheres of change both internal and external to the organisation will be identified and confirmed (verifying). An individual with well-developed cognitive restructuring skills therefore has a better ability to identify change needs. The OCIS is representative of these cognitive restructuring skills and therefore measures the interpretation of change, irrespective of the type of change that will be implemented after the interpretation process.

The interpretation of change as a cognitive restructuring process plays a strategic role in the creation of competitive advantage. If a management team does not possess these critical management competencies (low scores on the OCIS), change efforts will most likely be unsuccessful and give rise to a cost spiral. An additional reality is that the organisation will not approach change in a pro-active manner and will probably remain in a state of resistance (Fombrum, 1992, p. 48). Given that the OCIS is representative of these management competencies it can be used in selection processes and assessment centres.

The use of the instrument in an assessment centre holds

certain implications for the strategic functioning of a management team. Individual levels of ability to interpret change, can be determined by using the OCIS. Assessment on the basis of this criterion should lead to improved organisational performance, given that the opportunities for creating a competitive advantage are increased.

The OCIS can also be used to determine whether it would be a viable option to involve an external consultant in the change processes. In this context the instrument can be used to assess whether the management within the organisation has adequate competency levels to interpret change scenarios. If the competency levels are below average, it would be necessary to involve an external consultant in the change process. Furthermore, the ability of the change consultant to interpret change can be assessed by scores on the OCIS.

It is important to note that the preceding conclusions focus on the interpretation phase of the change process. Given that the implementation phase of the process takes place in a social context, this phase severely impacts on the human component of the organisation. An individual with well-developed cognitive restructuring abilities may not be sensitive to the influence and impact of human change. The field dependent individual with well-developed interpersonal skills can possibly be used as a strategist in the implementation phase of the change process. The management team that can influence change should strategically consist of both field dependent and independent individuals. The human resource practitioner could play a critical role in determining the composition of this team, particularly by ensuring that an optimal balance is maintained between the initiation and the implementation of change.

A need for research that assesses the influence that *field dependence* will have on the *implementation phase* of the change process, therefore exists. Given this context, research that investigates the relationship between individuals with both well-developed cognitive restructuring and interpersonal skills (mobile cognitive style) on the one hand, and the success of change processes on the other hand, could prove to be valuable. Individuals with mobile cognitive styles could possibly be considered to be ideal change agents. The relationship between transformational- and transactional leadership and the OCIS is a further research possibility. Another research option is the determination of the viability of the use of the HFT as an assessment tool for decision making in assessment centres. Research efforts can also be focused on the development of cognitive restructuring skills in order to increase an individual's sensitivity to identify change needs.

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The authors wish to thank Prof JM Schepers for his assistance concerning the statistical analysis. Financial support received from the Centre for Science and Development (HSRC, South Africa) is gratefully acknowledged. The opinions and conclusions are those of the authors. Requests for reprints should be addressed to LJ van Vuuren, Programme in Industrial Psychology, RAU, PO Box 524, Auckland Park, 2006.*