

FIELD-DEPENDENCE, INTELLIGENCE, AND SOCIALISATION
IN HONG KONG CHINESE

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by
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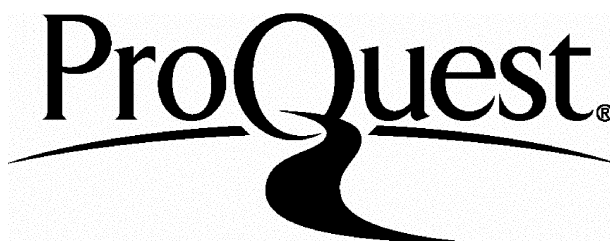
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SUMMARY

This thesis is concerned with the "field-dependence-independence" dimension which is held by Herman Witkin and his associates (1954, 1962) to underlie certain relationships between personality and perception. Specifically, I take issue with Witkin's claim that the "field-dependence" dimension is unitary, and with his attempt to explain individual differences in "field-dependence" in terms of "socialisation" practices and experiences; and hold that the extension of his theory into a cross-cultural setting has provided data which the theory, in its present form, is unable to handle.

A review of the literature had suggested that such factors as visual experience, intelligence, and education would cut across the "field-dependence" dimension, and might provide a better account of individual and cultural differences in performance on Witkin's tests than would the hypothesised factor of "socialisation".

To test these ideas empirically, therefore, I carried out a cross-cultural investigation in Hong Kong, selected as being the most suitable place to 'balance' the two points of view against each other. Two groups of Ss, one of 9-year-old children, the other of University students, were given a test battery which included Witkin's Rod-and-Frame and Embedded Figures Tests, measures of intelligence, and questionnaires concerning socialisation experiences (which were sent to the parents in the case of the 9-year-olds); and indices of ability in the Chinese language were obtained. It was predicted that the "field-dependence" dimension would fragment, in that Witkin's tests would be unrelated to each other; that Embedded Figures Test scores would be more closely related to ability in Chinese and to intelligence; and that no evidence would be found for the effects of "socialisation".

Results with the 9-year-olds were more supportive of Witkin's position. The Rod-and-Frame and Embedded Figures Tests were significantly correlated with each other, while the latter showed little relationship with ability in Chinese; on the other hand, no effect of "socialisation" was in evidence, and the role of some intellectual factor seemed everywhere apparent. With the students, however, my own position received greater support: again, "socialisation" seemed to have little effect on "field-dependence", and the Embedded Figures Test was much more closely correlated with an intelligence measure than with the Rod-and-Frame Test.

My general conclusion is that these principal results constitute a cogent criticism of Witkin's theoretical position, and suggestions are made about the type of modifications which are necessary if "field-dependence" theory is to continue to be of value in the cross-cultural context.

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CHAPTER I: THE BACKGROUND

CHAPTER I1. The theoretical framework of field dependency(a) Individual differences on the Rod-and-frame and Embedded Figures Tests

The theoretical framework of field dependency was formulated initially to account for patterns of individual differences in perception on the Rod-and-frame and Embedded Figures Tests.

The first of these was devised in a series of experiments by Asch and Witkin (1948a,b: Witkin and Asch, 1948a,b) in which an attempt was made to determine the relative importance of visual and postural factors in the perception of the upright. In the most advanced of these experiments, the researchers developed a technique designed to eliminate the normal visual field entirely, by conducting the experiments in a dark room using a luminous rod and frame as stimuli. The subject's task was to adjust the rod to a position he perceived as vertical, under conditions in which the frame (which surrounded the rod) was tilted in various positions to the left and right of true vertical. Such a tilt in the frame, as expected, caused a shift in the perceived upright towards the direction of the frame; but the range of degrees of accuracy amongst the different Ss tested was remarkably wide. "There were Ss who, despite the tilt of the frame, brought the rod close to the vertical; at the other extreme Ss perceived the tilted frame as upright, and aligned the rod with it" (Witkin and Asch, 1948b P.782).

By contrast, the Embedded Figures test involves the visual system only, being based on a series of geometrical figures originally used by Gottschaldt (1926) and adapted with a number of modifications by

Witkin (1950). Here the S is presented first with a simple figure, which is exposed for a few seconds only, and next asked to detect this simple figure in a larger, more complex whole in which it has been hidden or embedded. The time taken by S to detect the simple shape in the more complex one then becomes his score on the test. Again, a wide range of scores is found: from very rapid, almost immediate identification of the embedded figure, to a search lasting many minutes.

The ability underlying performance on these two apparently quite different forms of test has been given the label "field-dependence-independence" by Witkin and his associates (Witkin, Lewis, Hertzman, Machover, Meissner, Wapner, 1954; Witkin, Dyk, Faterson, Goodenough, Karp, 1962). A relatively "field-dependent" performance is one in which S's judgement is powerfully influenced by stimuli from the surrounding field: that is, he adjusts the rod to "vertical" in terms of the frame, or he finds great difficulty in detecting the simple figure in the complex one. On the other hand, a relatively "field-independent" performance is one in which S can resist the influence of the field, make judgements of the "vertical" in terms of postural stimuli, and find simple figures embedded in complex ones with relative ease. Individuals tend, claim Witkin et al. (1962) to show the same level of "field-dependence" or "field-independence" in their manner of performing on the two different tests; correlations between the scores on the two tests are reported as being consistently positive and significant.

(b) Stability of performance over time and sex difference

Not only does an individual show a similarity in his level of ability on these two tests, it is claimed, but also his performance shows

a marked consistency over time. Supporting this contention are test-retest correlations for the tests themselves, and data derived from developmental studies of "field-dependence".

For example, three-year-test-retest correlations for the RFT and the EFT, from Bauman (1951), are quoted by Witkin et al. (1962) as in Table 1.

TABLE 1: 'FIELD-DEPENDENCE': TEST-RETEST RELIABILITIES.

	Men	Women
RFT	0.84	0.66
EFT	0.89	0.89

Their argument is further supported by evidence from Adeval and McGough (1968) who obtained a four-year test-retest correlation for the RFT of 0.86, a result even more apparently convincing than that of Bauman. But it is with the EFT that the most consistent and reliable results have been found. Dana and Goocher (1959) obtained a one-week test-retest correlation with the EFT of 0.92; Jackson (1956), in presenting a short, 12 item form of the EFT, found its correlation with the full (24 item) form to be 0.95 and remarked that the use of almost any twelve items from the test would yield a similarly high degree of internal reliability. Split-half correlations, say Witkin et al. (1962), are even higher.

Furthermore, longitudinal study of performance on the various tests of "field-dependence" has provided considerable support for the authors' claim that the ability tapped by the EFT and the RFT shows considerable stability over long periods of time (Witkin, Goodenough and Karp, 1967). Though in general there was a trend towards increasing field-independence

during the course of development amongst the groups tested, individual self-consistency in performance across tests of "field-dependence" was, at all stages examined, clearly shown. Of 44 correlations reported between tests of "field-dependence" at different age-levels, 42 are in the expected direction and 33 are significant. Test-retest correlations for the RFT for 10 to 24-year-old groups of males and females are all significant ($p < .01$) and range in magnitude from 0.62 to 0.92, leading these authors to the conclusion that "... each individual tends to maintain his relative position among his peers in the distribution of measures... from age to age." (Witkin, Goodenough, and Karp, 1967, P.297). This suggests a "high degree of continuity during an individual's development in relative level" of "field-dependence".

An additional finding systematically reported in almost all the studies that have been made of "field-dependence", and which should be noted at this point, is that of consistent sex differences in scores on the EFT and RFT. At all stages of development after the age of eight, females are more susceptible to the influence of the field than are males (Witkin et al., 1962; Witkin, Goodenough and Karp, 1967). This is consistent with findings from many studies reporting systematic sex differences in task performance (cf. Broverman et al., 1968). These differences are not restricted to differences in the relative level of scores, however; it has repeatedly been shown that males perform more consistently than females (see for example table 1 in which test-retest correlations for the RFT are higher amongst males than amongst females). This raises the question, to be dealt with later, of whether these tests measure the same kind of ability in male and female populations.

(c) Witkin's view of perception-personality relationships and the "Socialisation" Hypothesis

The theory which has been developed to explain these findings of consistent individual differences, stability over time, and sex differences in perception is more than simply a theory of perpetual functioning. Witkin and his colleagues (1962) have put forward the view that differences in level of "field-dependence" are one manifestation of underlying personality differences in extent of "differentiation". This concept has been used in attempts to tie together a large number of variables, spread throughout the areas of perceptual, cognitive, and personality functioning, into a single unified theory of perception-personality relationships.

Crucial to this theory of "differentiation" is the concept of the "global-articulated dimension of cognitive functioning": "differentiation" is a process which takes place during development, by which perception and experience pass from a relatively more "global" state, gradually into a relatively more "articulated" one. Perception is said to be "articulated"....

"... if the person is able to perceive item as distinct from organised ground when the field is structured (analysis) and to impose structure on a field, and to perceive it as organised, when the field has little inherent organisation (structuring)".

(Witkin, 1967, P.234).

This takes place, according to the theory, not only in perception, but also in cognitive functioning and in the experience of the self. In infancy, it is held, the self is relatively undifferentiated; experience is global; and as the organism grows, so its experience becomes

relatively more articulated, and this shows itself in the degree of articulation imposed upon experience, in the degree of development of the sense of separate identity, and in the level of articulation of the body concept. Thus Witkin et al. (1962) have been at pains to show that the relative degree of articulation exhibited by an individual manifests itself in his manner of dealing with many different perceptual and intellectual tasks, with his concept of self, and with his body image; the stable individual differences found in the original experiments with the rod and frame are held to be but one example of this:

"The fact that the various indicators of developed differentiation tend to "go together" in the same person suggests that they are not discrete achievements of separate channels of growth but are rather diverse expressions of an underlying process of development toward greater psychological complexity".

(Witkin, 1967, P.235).

What is the source of these consistent differences which have such wide-ranging implications for the individual's psychological functioning? The bulk of the evidence to emerge from pertinent research (Seder, 1957; Witkin, Dyk, Faterston, Goodenough, Karp, 1962; Dyk and Witkin, 1965; Bing, 1963) favours an explanation in terms of social experiences influencing growth, specifically, influences in the family which encourage or inhibit the development of separate, autonomous functioning. In effect this results in a focus on child-training practices, and a study of the relationships existing between mother and infant.

Certain aspects of these relationships have been held to be more important than others, and research to date has focused on three main areas of interaction process: (1) processes related to the degree of

separateness which develops between mother and child, e.g. amount of physical contact in infancy, degree of dependence of child on mother; (2) the degree of control exercised over the child's aggressive and exploratory behaviours; and (3) the nature of the mother as a person, her own level of "differentiation" (Corah, 1965), patterns of needs, and so on. (Though it's not necessary at this point to go into these in detail, I feel the broad outlines must be sketched).

Finally in a broader context, it has been claimed that the nature of societies and cultural processes responsible for the moulding of personality in the shape required by society's needs, play a major part in determining the level of "differentiation" typically achieved by members of the society. This point and its amplification brings us to a consideration of the cross-cultural work with which this thesis is specifically concerned.

(d) Cross-cultural studies: The theoretical background

A number of cross-cultural studies of "field-dependence" and of its relations to identifiable cultural variables have attempted to extend the applicability of the theory outside the boundaries of "Western" industrialised societies, and to forge a link between the work of psychologists and related research in social anthropology. This trend has been a fairly recent one and its full implications have not yet been carefully worked out. However it is possible to examine the basic findings of the studies which have been the focus of attention for the theory.

The initial impetus in this field came from the work of Dawson (1963; 1967a, b). The line of reasoning by which the theory of "field-

dependency" has been brought to the cross-cultural field runs roughly as follows: different societies live in different physical and biological environments. The characteristics of the environment in which a society lives, by determining the manner in which the society obtains its food, also have strong implications for the mode of social organisation which arises. This in turn is responsible for the specific methods which the society uses for the training or rearing of its members, and for the "typical" features of personality processes which emerge; amongst these will be the level of "differentiation" achieved in personality and perceptual processes. Hence it should be possible to demonstrate that societies with different methods of food-gathering and child-training also manifest different levels of perceptual skills, of the kind described above.

The anthropological evidence supporting the initial stages of this argument comes from the work of Barry, Child, and Bacon (1959). In an extensive survey of 104 nonliterate societies from all parts of the world, these authors attempted to demonstrate the existence of a relationship between the level of food accumulation in the society and certain personality characteristics of the society's members: that is, societies which differ in the nature of their "subsistence economy" were compared in the methods and emphases of their child training. Subsistence economies were first classified, as being either predominantly pastoral; agricultural with animal husbandry; cultivating grain; cultivating root crops; predominantly hunting; or predominantly fishing. They were then rated according to the relative amount of food accumulation thought to be typical of each - agricultural and pastoral economies high, grain and root crops economies intermediate, and hunting/fishing economies low. Next,

several ratings of child training practices were taken from analyses of ethnographic documents conducted by two independent judges. It was predicted that, in each society, the emphasis in child training would be towards the development of kinds of behaviour useful in the adult economy; specifically, in societies with low levels of accumulation of food resources, adults should tend to be individualistic, assertive, and venturesome; whereas in societies with high levels of food accumulation, adults should tend to be conscientious, compliant, and conservative.

Results taken from a detailed analysis of 79 societies supported the main hypothesis. The authors suggested that their results could be explained in terms of a general underlying variable which they chose to call "pressure towards compliance versus assertion". "Societies with high accumulations of food resources almost always had predominant pressure towards compliance; whereas societies with low accumulation of food almost always had predominant pressure towards assertion". (Barry, Child and Bacon, 1959, P.59).

(e) Cross-cultural studies of the Witkin hypothesis: the work of Dawson and Berry

The psychological implications of these results were first investigated by Dawson (1967a, b). Although Dawson does not here make explicit the anthropological background to his argument, he does investigate the perceptual abilities of two cultural groups which differ considerably in the degree of pressure towards compliance involved in their child-rearing methods.

Specifically, Dawson was concerned to explain the inability of some African Ss to give three-dimensional interpretation to two-dimensional pictures despite their high level of intelligence and education. (cf. Hudson, 1960). Suggesting an explanation in terms of "a limiting

spatial-perceptual factor deriving from certain aspects of the African environment", Dawson focused attention on child-rearing processes likely to contribute to a field-dependent perceptual style. In order to test this hypothesis, Dawson administered a battery of perceptual tests, among them the EFT, to two samples of Africans in Sierra Leone, drawn respectively from two tribes, the Temne and the Mende, known to differ in their emphasis on the inculcation of compliance v. assertiveness in child-rearing. Specifically he predicted that the Temne, whose values are more aggressive, and whose child-rearing methods emphasise strict discipline, maternal dominance, and greater pressure towards uniformity, would be more field-dependent than the Mende, amongst whom child-rearing is less strict, mothers less dominating, and individual initiative encouraged. In two samples matched in age, occupation, sex, intelligence, and education, with extraneous factors controlled, these predictions were substantially borne out. Furthermore, there was found to be a significant relationship between degree of strictness of maternal discipline, as estimated by subjects' ratings, and observed scores on tests of field-dependence. Dawson's conclusions, in support of Witkin's "socialisation" hypothesis earlier described, have been considered by Witkin himself to "provide additional validation of our original findings". (Witkin, 1967).

What has been taken as further support of the Witkin-Dawson position is a study by Berry (1966), which, though conducted later than Dawson's study, appears in the literature earlier. This study focuses more explicitly on the anthropological material brought forward by Berry et al. (1959), by making comparisons in level of field-dependence between a hunting society with child-rearing procedures emphasising assertiveness (the Canadian Eskimo), and an agricultural society whose child-rearing emphasises compliance (the Temne). Predictions regarding the relative

level of scores on the EFT amongst samples from these two societies were again confirmed: the performance of the Eskimo sample on four tests of spatial ability (Kohs blocks, the EFT, Morrisby shapes, and Raven's Progressive Matrices) was consistently superior to that of the Temne, and more closely approximated the performance of a Scottish sample included for comparative purposes.

Several other points emerging from Berry's study have been held by Witkin (1967) to be substantially in support of his main contentions. Firstly, as in Dawson's (1967) study, Berry concluded that the hypothesis relating level of field-dependence to severity of parental discipline during childhood "... tends to be confirmed". Secondly, two samples were taken from each culture: a more traditional, un-Westernised group, and a "transitional" sample with a history of contact with European civilisation. It was found that both Eskimo and Temne "transitional" samples had higher "field-independence" scores than their respective "traditional" counterparts. Thirdly, following the observation that the sex-role differentiation normally found in most cultures was not present amongst the Eskimo, and in particular that women were not expected to play a dependent role in the culture, Berry predicted that the usual sex differences in field-dependence scores would not appear in the Eskimo samples. This was confirmed by t-tests which, while showing significant sex-differences in spatial scores amongst the Temne, failed to do so amongst the Eskimo. This result has been replicated by MacArthur (1967).

The nature of cross-cultural studies of field-dependency will now, it is hoped, be clear. The above are the main supporting studies for the theory of "psychological differentiation" proposed by Witkin et al. (1962), outlined in an earlier section. In a later section I will return to

their studies in a more critical vein, and consider other studies offering equivocal evidence and showing the very complex nature of the phenomenon. I have tried, in this section, to set out the arguments for the use of cross-cultural methods in the investigation of "field-dependence", and to cite the main supports for Witkin's position.

2. Disquiet with the theory

The previous sections have set forth the main contentions of the theory of "field-dependence", and have outlined the major empirical studies undertaken which support it. In the sections to follow I present arguments and evidence which suggest that there is considerable room for disquiet with the theory as it stands at present. The initial reasons for this scepticism (sections (a) and (b) here) stem from questions concerning the theory's inherent plausibility.

(a) The theory seems to explain too much

Perhaps one of the most immediate sources of disquiet is the wide-ranging generality of the theory of "psychological differentiation", a characteristic becoming less common amongst psychological theories as the discipline focuses on progressively narrower areas of research. A theory which proposes to account for such a diverse range of perceptual, cognitive, and personality differences in terms of such a limited number of concepts tends to arouse suspicion, particularly in view of the fate of such theories in the past. For the theory is concerned not only with individual differences and sex differences in perception, but also with such differences in "cognitive style", problem-solving ability, spatial ability, body-image, and the use of ego-defences (Witkin et al., 1962);

in patterns of dream recall (Schonbar, 1965; Witkin, 1970), conformity (Linton, 1955), and even eye-dominance (Oltman & Capobianco, 1967) and susceptibility to simulator sickness (Barrett et al., 1969). It is not simply that these phenomena are so numerous, but that they are so disparate and cover such a wide psychological spectrum, drawn together by rather vague metaphorical thinking (Zigler, 1963, P.464). "The main trouble", says Vernon (1969), "is that (Witkin) seems to prove too much: there are so many cross-currents and so many underlying factors that it is hard to tell whether the measured ability differences should be attributed to general intelligence, to social-class attitudes, to sex, to temperament and personality, or to neurological characteristics, rather than primarily to mother-child relationships" (Vernon, 1969, P.59).

In itself, of course, mere suspicion cannot demonstrate a theory's inadequacy. It is possible that "psychological differentiation" might be the key to individual differences of many kinds, still to be reported. But scepticism is nevertheless aroused. "The conceptual scheme", remarks Gardner (1963), "may be somewhat less impressive than the remarkable evidence of individual consistencies offered". Despite the greater conceptual sophistication of the 1962 version of the theory, the proliferation of studies since 1954 linking "field-dependence" to so many other types of individual differences makes Gardner's remarks ring even more true today.

- (b) the hypothesised "causal" link between perceptions and family experiences seems tenuous on a priori grounds

On a purely rational or a priori basis, certain statements can be made about the nature of psychological "causes". Some ideas about links between different aspects of behaviour and experience seem intuitively

more plausible than others, and more often than not, the former turn out to correspond with the facts, as revealed by experiment; perhaps this is why psychology is said to be so platitudinous. Thus for example, while it seems intuitively acceptable that "prolonged reduction of sensory input leads to hallucinations", the statement that "reproductive behaviour in humans is greatly influenced by cyclones" is one which we would automatically interpret with a greater degree of caution, since at the moment one cannot think of any mechanism by which such a link might be explained. Similarly, many factors are known to influence perceptual judgements: the state of the receptors, prior experience, "set", etc.; intuitively, however, I find a link between a mother's treatment of a child in its infancy, and the child's later capacity for finding embedded figures, at best a tenuous one. I am not convinced by the evidence which is presented to support the idea of such a link; and tend to suppose that an alternative explanation must be available if only it can be found. Only when the more likely and scientifically parsimonious "causes" have been experimentally eliminated can the less likely and more "global" ones become acceptable. And it is exactly this process of elimination which is missing from the work on field-dependence.

My statements above reflect a leaning towards "reductionism", in contrast to the view of psychological explanation implicit in the work of Witkin et al., (1954; 1962). The approach of these researchers derives in part from Gestalt psychology and the work of Kurt Lewin, and in part from clinical psychology, especially the work of Freud. While these wide approaches obviously have considerable value in the understanding of human behaviour, it seems to me that in the study of perception, the specific parts played by prior experience, intellectual activities and

educational background, ought first to be considered, particularly in a situation in which tests are involved.

Such objections as these are not, of course, directly damaging to the theory of field-dependency. They are included here to explain why I am disquieted by the findings of Witkin et al. The next sections examine the strengths and weaknesses of the methods normally employed in laboratory research on "field-dependence".

3. The Laboratory data : evaluation.

(a) Reliability of the EFT

This topic has been dealt with in section 1(b) above, and in general, the results discussed there suggest that both the EFT and the RFT have achieved satisfactory reliability in the results so far presented. The EFT in particular exceeds in internal consistency almost every other psychological test. However, an additional point requires attention. Both the EFT and RFT, and particularly the latter, produce measures of internal consistency which are almost always higher for males than for females. This result seems to create no difficulty for Witkin et al. (1962), who see it as an expression of sex differences in the relative extent of "field-dependence", supported by evidence that within each sex, mode of field approach is related to measures of masculinity and femininity. The authors do not deal with the question of why males are not only more "field-independent" but also more consistently so.

(b) Validity of the EFT

The pattern of reliability of the EFT is generally satisfactory. Its relationship to the hypothesised "field-dependence-independence"

dimension, however, is not by any means a simple one. While correlations between the EFT and RFT are consistently high and statistically significant for males, the same cannot be said amongst females, where correlations as low as 0.21 and 0.30 for college and hospital samples are reported by Witkin et al. (1962). This leaves open the question, reinforced by the statements of the preceding section, of whether the tests measure the same kind of ability in males as in females. It is all too easy to assume that because the test is the same, so must be the ability tapped by it. But in fact a test's face validity and its actual construct validity may be two entirely different things. This is dealt with in Section 5(a)(3) below.

More to the point, the nature of the personality correlates of the individual's performance on the embedded figures test remains obscure. The expectations of the theory on this point are made clear by Witkin et al. (1954) where it is stated that the "field-dependent" person is characterised by passive submission to the environment, whereas the "field-independent" person exhibits tendencies towards the use of active coping processes. Marlowe (1958) attempted to find the psychological correlates of "field-independence" by administering the EFT and the Edwards Personal Preference Schedule to 69 undergraduates (of whom, notably, 57 were female). He hypothesised that "field-independence" would be positively correlated with needs Achievement, Autonomy, Dominance, and Intraception, and negatively correlated with Succourance. All correlations were, in fact, low and only two, intraception, positively related, and succourance, negatively related, provided statistically significant coefficients. This is in contrast with the findings of Wertheim and Mednick (1958), who, using a technique rather more "projective" in nature, found EFT

performance to be positively related to the need for Achievement (N.B. 31 of the 42 Ss were female), in other words, the higher the need for Achievement, the more field-independent the individual. (This provides a little confirmation for the theory, in supporting Marlowe's (1958) hypothesis; however, it opens up, on the other hand, the question of the role of motivation in test performance.) Different again were the results of Dana and Goocher (1959), who found only Edwards "need for Order" to be significantly related to mean EFT detection time, which is the accepted EFT measure of greatest reliability. This finding led these authors to the conclusion that "the obtained relationships do not augur well for the EFT as a personality measure" (Dana & Goocher, 1959, P.101).

There is certainly a great deal in these findings which requires clarification. If, on the basis of perceptual tests, Witkin et al. infer the existence of perception-personality relationships of a given kind, but find that such relationships fail to appear, does this not point to some defect in their theory?

Witkin (1960), in a reply to the above considerations, admits that the evidence is inconclusive; and certainly, the evidence concerning relationships between the perceptual tests and Projective Techniques such as the Rorschach and the Thematic Apperception Test remains impressive. It is possible too that since most of the subjects in the studies quoted above were female, the pattern of results emerging might be other than that predicted from studies initially using male samples. However, some other evidence, to be presented below, casts doubt on the EFT's value as a measure of stable characteristics of an individual's functioning (Section 3(b)(1)).

(c) Methodological Weaknesses of the RFT

The Rod-and-frame Test, which has so far shown greater survival properties in studies concerned with perception-personality relationships, has more recently been the focus of criticisms which centre on various methodological weaknesses. A great deal of this evidence, it should be said at the outset, is concerned with the portable RFT devised by Oltman (1968), and so cannot justifiably be used in criticism of Witkin's own methods; it does however have important implications for the use of this test in cross-cultural research, specifically recommended by Witkin (1967).

Lester (1968), in a review of studies of the validity of the RFT and the method of its use, drew the conclusion that considerable improvement would be necessary before reliable statements could be made concerning perception-personality relationships. The "traditional" or "stationary" forms of the RFT was shown by Lester to involve methodological weaknesses arising from:

- (1) the lack of control of head position;
- (2) errors due to starting position effects;
- (3) the failure of most studies to take control readings;
- (4) the effects of instructions, especially those implicit in the presentation of the test materials.

A number of studies have expressed doubts concerning the stability of RFT performance (Cohen and Tepas, 1958; Jackson, 1964; Wolf, 1965; Goldstein & Chotlos, 1966; Jacobsen, 1966), a question of reliability rather than validity, and its apparent susceptibility to change when such factors as sensory input and physiological arousal are experimentally manipulated.

The portable form of the RFT, the most widely used version of which is that of Oltman (1968; there are several other versions), has also

recently been shown to involve methodological difficulties; and results which have important implications for psychological differentiation theory as a whole have been obtained. Firstly, some researchers working with portable RFTs have reported 'validity' correlations (i.e. correlations, in this case, with the stationary test) substantially lower than those reported in the original paper on these particular tests (Irving and Henderson, 1971; Vaught, 1969). On this point, however, it seems probable that the Oltman RFT represents a considerable improvement in some respects over the stationary version, in being equipped with a headrest and also in incorporating in administration allowance that S can see the apparatus with the rod adjusted to true vertical prior to experimental trials.

A second and more worrying feature of the portable RFT from the cross-cultural point of view, is discussed by Lester (1971), who administered the RFT to 50 Ss and subsequently gave them a short questionnaire about the test. Uncertainty about the test's nature and purpose was associated with high error scores. The more elaborate S's concept of the test's purpose, the higher his error score tended to be. One can readily see how such a result, obtained with American College students, looms ominously over the question of the test's value when administered to non-Western, uneducated subject samples; the word "vertical" involved semantic difficulties even without the intervention of an interpreter.

Thirdly, some recent research with the portable RFT has provided evidence for the proposal, gaining greater currency at present, that sex-differences in scores on tests of "field-dependence" are more easily explained in terms of an "arousal" hypothesis than in terms of

"psychological differentiation" (Morf, Kavanaugh and McConville, 1971).

These writers suggest that RFT performances of males and of females are functions of different determinants; and that different factors influence performance at different points in time on a series of trials. (This paper will be more fully discussed in Section 5(a)(3) below.)

In combination, the findings concerned the methodology of the RFT and the EFT are not reassuring for the hypothesis of "psychological differentiation". They reveal that the foundations of the theory are not secure enough to ensure the theory's continuing plausibility; and specifically they suggest that other factors, intrinsic to the test situation itself, may have a considerable degree of influence upon performance.

(d) Reliability and validity of questionnaires and interviews

An entirely different aspect of Witkin's methodology, on examination, reveals difficulties which would suggest the need for caution in interpreting his findings. This concerns the methods used to investigate the nature of mother-child interactions which have been identified as important in the determination of an individual's level of differentiation (Seder, 1957; Witkin, Dyk, Paterson, Goodenough, Karp, 1962; Dyk and Witkin, 1965).

The most frequently used methods of exploring this area of mother-child interactions have been, not observation of interaction, but questionnaire and interview methods, usually conducted on an intensive, clinical basis (Witkin et al., 1962; Dyk and Witkin, 1965). These methods, however, do not unfortunately provide a firm basis for the conclusions drawn from them, since their reliabilities and validities are open to question. A look at some of the studies of these methods

themselves reveals a disappointing pattern of lack of concordance between parental attitude statements and actual parental behaviour.

Yarrow, Campbell and Burton (1964), in a study of comparisons of prior case record data on child characteristics and mother-child interactions (n=226 mothers) found only modest reliability and validity for the interview data. Brody (1965), administering attitude surveys to mothers of 50 pre-school children, and comparing these with scores on maternal behaviour observed in mother-child interactions, found a complex pattern of relationships existing between attitudes and behaviour. She concluded that "... in the present study, factors other than attitude were undoubtedly operating in the behaviour situation" (P.323), and suggested that inhibition in the behavioural situation may well have concealed, for example, authoritarian behaviour manifested in an attitude scale. Thus questionnaires may not be as unreliable as they at first seem. Zunich (1962) however, produced evidence of a much more decisive and pernicious nature for the attitude scale (like Brody he used the parent Attitude Research Instrument). Of 272 comparisons made by means of correlation coefficients, between scores in seventeen maternal behaviour categories and sixteen attitude subscales, only 12 provided statistically significant relationships ($p < .05$). This is no more than would be expected by chance. It is possible, however, that the lack of apparent relationships is a function of observational settings: the source of unreliability may be the behaviour situations rather than the attitude scale; it is difficult to decide which is more artificial.

Two points may be appended concerning these findings. First, it should be recognised that the question of the validity of interviews and questionnaires remains an entirely open one. Second, it is worth noting that the above results were obtained with widely used, specially designed

techniques for the study of parental behaviour; whereas the techniques used in the study of antecedents of "field-dependence" have neither been widely used nor properly validated.

Thus it can be seen that there are a number of methodological problems surrounding the theory of "field-dependency" and the tools of its research. Until these are properly dealt with, the foundations of the theory must certainly remain very insecure. In the next section some studies are examined which provide evidence contradictory to the theory's basic postulate of stable, underlying characteristics of personality which manifest themselves in perceptual functioning. Attention is focused on the EFT since it is the main tool of cross-cultural research.

(e) Evidence of learning on the Tests

(i) the Embedded Figures Test: early studies

If the level of "field-dependence" exhibited by an individual represents a stable, consistent feature of his perceptual functioning, then we should not expect large changes in his performance level over time due to the effects of practice or training. The question, of course, is one of relative stability: Witkin, Goodenough and Karp (1967) themselves point out that learning effects are to be observed on the EFT (p.294) and are fully aware of the developmental trends shown by all Ss from relatively higher to relatively lower 'field-dependence' scores. However, I consider that learning effects have a significance much greater than these authors allow, indeed that they present crucial difficulties for the theory of "field-dependency".

First of all, it is noted by Witkin et al (1967), that while "a clear learning effect" has been demonstrated by some researchers on the

ERT, evidence from numerous studies indicates no such learning effect on the RFT. The authors ascribe this difference to the fact that Ss possess knowledge of results during the course of testing on the ERT, whereas on the RFT they do not. This is a reasonable explanation but no attempt has been made to assess the effects of knowledge of results on the RFT. A totally different conclusion, that the ERT and the RFT are measuring two different aspects of perceptual functioning, (one less stable than the other), might equally well be drawn. If mere knowledge of results has such an effect on performance, the underlying trait of perceptual or personality functioning must be malleable indeed.

Secondly, and more serious, a considerable number of studies not dealt with by Witkin and his associates suggest that the capacity to improve performance on a task of finding embedded figures is a principal feature of performance itself. Let us look at some of these in more detail.

The original experiments with embedded figures were carried out by Gottschaldt (1926), his main purpose being to provide empirical support for the Gestalt theory of perception. Essentially this meant demonstrating that experience was of little importance in the process of perceiving embedded figures and learning to find them. Gottschaldt's method was as follows. He presented S with simple figures (a-figures) projected on a screen for one second and repeated with varying frequency. After complete exposure to these patterns, more complex patterns (b-patterns) containing a-figures were shown for two seconds each. S was asked to describe the b-patterns, mentioning anything noticeable about them. It was found that repeated presentations of the a-figures, even when carried to the level of 520 exposures, made no significant differences

to S's comments on the b-patterns: he did not report perception of a-figures in them. This was taken as a demonstration that "... the effect of frequent exposures of one part upon the subsequent perception of a complex whole is extremely slight" (Gottschaldt, 1926, P.317). However, as Gibson (1969) has pointed out, the experiment does not produce any datum that would either confirm or refute a hypothesis; S's spontaneous responses do not tell us whether or not he saw the simple figures in the complex ones. Hence Gottschaldt's experiment fails to demonstrate his claim; and it may be that the entire process of using embedded figures to assess stable features of personality is based on a misunderstanding of the nature of the task itself.

For a number of studies have demonstrated precisely the effect which Gottschaldt failed to obtain. Djang (1937), in criticising Gottschaldt's method, decided to use figures in which many organisations were more or less equally probable: they lacked the "pragnanz" of Gottschaldt's shapes. Thus his materials consisted of irregular dot patterns. The experiment showed that the hidden figures were seen as separate units in their respective complexes 20 times more often by the experimental group (previously exposed to the figures) than by the control group, and 77 times more often on the first trial. Experience certainly does make a difference to the way that a form is organised, and to the process of finding a hidden form within it.

This does not, however, demonstrate that the skill of finding embedded figures improves with practice; merely that the effects of practice or experience are present when the same simple figures are presented repeatedly. Witkin (1950), in designing the present form of the MFT, was fully aware of the effects of this kind of practice. Djang

had noted that "... discovery of a simple figure in one complex setting seems to make more probable the discovery of the same figure in another setting" (1937, P.59). This is precisely the task involved in parts of the EFT, and Witkin (1950) attempted to reduce the role of such practice effects by using fewer complex figures to correspond with each simple one.

But to demonstrate that an individual's capacity for detecting embedded figures increases with practice, it is necessary to show that transfer effects can occur. Hanawalt (1942) found that not only was repetition of the same SIMPLE designs effective in aiding their detection, but also that there was positive transfer to new simple and complex designs. Thus it would seem that S is not just learning distinctive features of the same simple designs, for transfer to new complex designs, as Gibson (1969) claims; but also that S is developing skill in dealing with the situation: becoming increasingly less distracted by the surrounding embedding cues. S learns to attend to the features of any stimulus which will help him perform his task. This bears out a suggestion from Hanawalt that "... the Ss become adept in disregarding the figure in its entirety and analyse it in particular places." (1942, P.147). Further, when Hanawalt retested one S after two three-year intervals of no practice, he found that the advantage gained in the experimental training sessions still persisted.

Other studies (Brady, 1933; Henle, 1942; Frances, 1963) have found practice effects similar to those encountered by Djang (1937); in addition, Schwartz (1961), who corrected a number of methodological faults in Gottschaldt's work, found a clear-cut difference in the discovery of embedded figures in favour of Ss who received preliminary training. Finally, some fairly recent experiments clearly show the existence of

practice and transfer effects which are, effectively, a process of skill acquisition in the detection of embedded figures.

(ii) learning and the EFT: more recent work

These studies (Kolers, 1960; Kolers and Zink, 1962) used a forced choice detection method, and the experimental materials consisted of patterns constructed by a method of Attneave and Arnoult (1956). Each item consisted of four simple figures and three complex figures, one and only one of the former being included in all of the latter. Each item with its seven patterns was presented tachistoscopically on a card with the complex forms on the top row and the simple forms on the bottom row. S's task was simply to choose which of the four simple figures he thought was present in all three complex ones.

Each card was presented 25 times or more and S was asked to call out his choice figure each time; his choice was not corrected. Successful detection was said to have occurred after ten consecutive correct responses had been given beyond the fifteenth trial. S's score was the number of the first trial commencing his successful run of ten.

The first point of note here is that since S's choice was not corrected, knowledge of results could be excluded as a possible source of practice effects. Secondly the results clearly showed the effects of two kinds of exposure learning. In the first, the probability of a correct response increased as trials on a given problem progressed: this is an expected practice effect of the kind found by Djang (1937) and against which precautions were taken by Witkin (1950). In the second, there was transfer of learning from problem to problem. Correct detections were made sooner on consecutive items, the speed of detecting embedded figures

itself increased with practice. Figure 1 clearly shows these two kinds of effects: (the total practice time was divided into six successive periods, 16 problems per period):

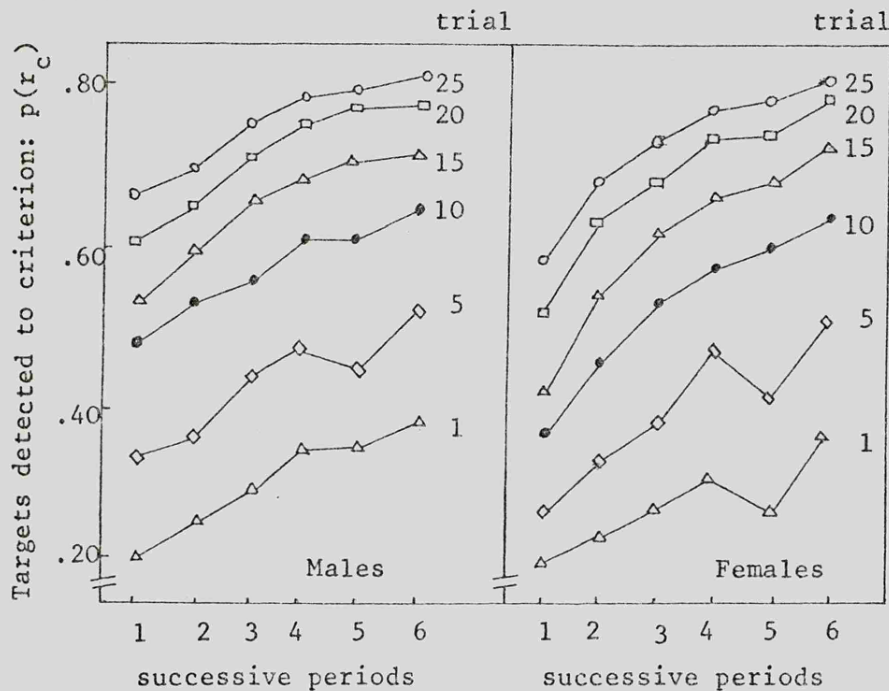


Figure 1: Exposure Learning and finding
Embedded Figures.

(From Kolers and Zink, 1962).¹

not only is there a rise in the number of correct detections over successive trials (specific practice effect), but also the number of correct detections for each trial number rises over successive periods

¹ The ordinate shows practice effects over trials on a given problem; the abscissa shows improvement effects over problems.

(transfer of practice).

These results indicate that practice effects are not confined to "familiarity" effects alone: a skill is being acquired which enables S to improve his performance on the task. Both Hanawalt (1942) and Kolers and Zink (1962) indicated that Ss adopted, by degrees, a more analytical approach to the problem - involving active search, focusing on distinctive features, the use of strategies of detection.

Such reflections indicate that one of two alternatives must be the case. Either (1) the performances and skills involved in tasks of this type are substantially different from those involved in "field-independence" as conceived by Witkin et al. (1962); or (2) 'field-dependence' as measured by the EFT is not an indicator of as stable underlying features of personality as the "differentiation" theorists contend, in which case its value for studies of perception-and-personality relations is in doubt.

I contend that the implications of these results for the theory of "field-dependency" have been greatly underestimated. Further questions are raised by the observation, common to all the studies so far mentioned, that the factors of motivation to succeed and of selective attention played a large role in the performance of individual Ss, a topic dealt with in section 5(a) below. In the next section, the effect of practice is viewed in the context of the sex differences so frequently found in "field-dependence".

(iii) the EFT and sex differences

Sex differences in the extent of "field-dependence" have been a widely reported finding in studies using the Embedded Figures Test. While biological factors cannot be ruled out as causes of this, the difference is thought by Witkin et al. (1962) and Witkin (1967) to be due to

differences in the nature of the socialisation processes to which the sexes are subject, and to the differences in the amount of dependence and independence involved in adult male and female roles in Western society. Cross-cultural evidence in support of this has already been briefly mentioned in section 1(d) above and will be considered in greater depth in section 4 below.

However, some recent research has suggested that, firstly, the "consistent" sex difference in EFT scores is not as stable as it seems at first glance; and secondly, that the EFT may not be measuring the same kinds of ability in both the sexes. The first of these points I deal with here, the second, involving an "alternative hypothesis", is discussed in Section 5(a)(3) below.

A study by Goldstein and Chance (1965) has produced learning or practice effects on the EFT which suggests that the sex differences found in other studies might well be a product of the testing situation. As this paper points out, Witkin's (1950) data on EFT scores show clear within-session reduction in discovery time scores, for both males and females, yielding significant differences between the means of the first 12 and last 12 items, which are not discussed by Witkin. In an investigation of these practice effects, Goldstein and Chance (1965) administered a series of 68 embedded figures (including the 24 of the EFT) to 13 males and 13 female Ss. Two main results emerged; (1) from the first block of trials to the last block of trials, the mean discovery time for women decreased by 74%, for men by 65%, a substantial learning effect; (2) the sex-related difference, significant in block 1 (the first 10 trials) beyond the .05 level of confidence, failed to be statistically significant in block 8 (the last 10 trials). Clearly, this would be, to

Witkin and his followers, an unexpected result. Figure 2 illustrates the authors' conclusion that "... discovery times....are inversely related to the number of EFT items" (Goldstein and Chance, 1965, p.362).

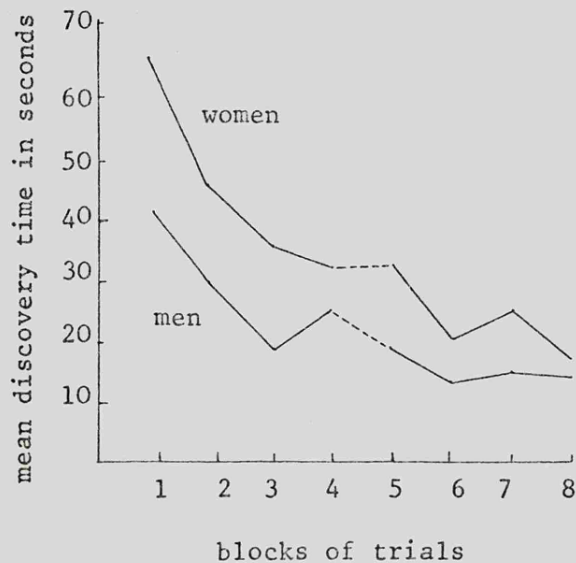


Figure 2: Sex-related differences on
Embedded Figures over time.

(From Goldstein and Chance, 1965).

A comparable result, from the work of Kolers and Zink (1962), can be found in Figure 1 above. In period 1 of their experiment, the initial probabilities of correct detection can be seen to be lower for females than for males, for almost all trial numbers; by contrast, in period 6 these differences are negligible or even slightly reversed.

Such results create a dilemma for the theory of "field-dependence". Two equally problematical alternatives again present themselves. Either, firstly, the EFT and the RFT do measure the same ability, in which case it seems that "field-dependence" is responsive to training, so losing most of its value; or secondly, if performance on the RFT is not

trainable, this suggests that the EFT and the RFT are not measuring the same kind of ability (Goldstein and Chance, 1965).

When one considers that the sex differences discussed by Witkin et al. (1962) form one of the empirical cornerstones of their work, the suggestion that such differences are grossly unstable presents serious problems for "differentiation" theory. It seems to me that such a result moves the capacity for performance on the EFT outside the realm, as it were, of central "global or molar" personality processes and into the area of more specific or molecular perceptual processes.

Whatever the case may be it seems obvious that modifications are required in the concept of "field-dependence". The roles of prior visual experience, practice effects, and conditions surrounding the administration of the test have not been adequately explored. It would appear to be the case, and the present thesis contends it is the case, that the task of finding embedded figures is an extremely complex one, susceptible to the influence of a number of factors much more diverse than those considered by Witkin et al. (1962).

(f) Inadequacy of evidence supporting the theory

In addition to the evidence presented above, showing methodological weaknesses in the research supporting "field-dependency" theory, and the evidence suggesting that factors other than "field-dependence" influence scores on embedded figures tests, a third type of weakness must be noted in the laboratory data, namely the fact that much of the evidence presented supposedly in support of the theory is not adequate demonstration of the theory's strength. An illustration may make this clear.

Witkin et al. (1962) cite the work of Young (1959) in support of their position; noting that Holtzman (1955) had criticised serious

weaknesses in the earlier work of the Witkin group (Witkin et al., 1954), Young (1959) replicated their study with a more heterogeneous group of Texas college students. The tests included a perceptual battery, with three forms of the RFT and Jackson's (1956) short form of the EFT, and a battery of personality tests essentially similar to those used by Witkin. Intercorrelation matrices were produced, separately for male and female Ss, in order to test four main hypotheses encapsulating the Witkin view of perception-personality relations. But it seems to me that in reporting his findings Young accepted evidence as confirming the theory when it did so only partially and even very weakly.

Hypothesis 1 was that "... there is a common factor of field-dependence running through all the perceptual tests used in this study." This hypothesis was taken to be confirmed since 18 out of the 20 correlations amongst the tests of the perceptual battery were significant. However, six of these correlations were between three different forms, or series, of the RFT; and of the 6 correlations between the EFT and each series of the RFT, three were significant amongst women but only one amongst men. Not only is this rather weak evidence of an EFT-RFT correspondence amongst men, but it is also a reversal of the normal finding of greater consistency amongst males.

The three remaining hypotheses derived from "differentiation" theory focused upon aspects of perception-personality relationships. For the second hypothesis, two out of ten correlations were significant for men, none for women; for the third, two out of five correlations were significant for women, one out of five for men; for the fourth, two out of five correlations were significant for men, one out of five for women. Such results are not by any means impressive. Furthermore, at each stage

the author refers to the work of Witkin et al. (1954) and quotes significant correlations therefrom. But it is of no value when the replication of a study fails, to quote data from the original study in support of the hypothesis - this is merely begging the question. In any case, if the theory has any predictive value then it ought to score a greater number of successes than it did in this particular replication.

Finally, Young (1959) notes that the four "Witkin" hypotheses were at least partially confirmed by his data, "... and 26 (29%) of 90 coefficients were found to be statistically significant at the .05 level, a number far greater than chance expectations" (P.191). What this in fact means is that the theory is a successful predictor less than one-third of the time, hardly an index of validity even in a psychological theory. I would say in addition that the coefficient value necessary for significance at the .05 level, $r=0.29$, because of the amount of variance unaccounted for, does not represent a psychologically meaningful statistic.

Criticism of the "field-dependency" theory does appear in the work of Young (1959) resting on a different basis. Following Gruen (1955), Young agrees that "... the dimension appears not to be as pure, factorially speaking, as Witkin believes. What is needed is the determination of other relevant variables which apparently cut across the dimension....." (P.192). It is this question of the factorial unity of "field-dependence-independence" which leads to a critical examination of the cross-cultural evidence which appears in the next section. It only remains to point out here that Young's paper (1959) is not unique: I hold that there has been too ready an acceptance of the "differentiation" theory in numerous studies, greatest among those of the "field-dependence" theorists themselves.

4. The Cross-Cultural data: evaluation

The argument of this section proceeds as follows. It is held that the extension of the theory of "field-dependency" to cross-cultural research has produced results of a degree of complexity which the theory, in its present form, is unable to handle. First, results are considered which suggest that the "field-dependence-independence" dimension is neither so simple nor so widely applicable as Witkin et al. (1962; Witkin, 1967) contend. Next, the discussion focuses on data from several different sources which suggest that the antecedents of individual levels of performance on "field-dependence" have not been located. Specifically, it is argued that the results of Berry (1966) do not make clear the nature of the cultural determinants of "field-dependence"; and that the factors of (1) intelligence and (2) education play a larger role in determining EFT scores than has been recognised hitherto. Finally, the conclusion is drawn that cross-cultural research is required which demonstrates, and assesses, the importance of these other factors.

(a) Wober's results

The results obtained by Dawson (1967a,b) in the main supported the contentions of Witkin concerning the role of socialisation in the development of an individual's level of "field-dependence". Dawson's research, however, incorporated only the EFT and Kohs Blocks as measures of "field-dependence-independence", except in so far as his tests of three-dimensional pictorial perception and spatial ability are looked upon indirectly as indications of "differentiation". Thus his work assumed that in African tribal groups, the high correlations found between the EFT and the RFT amongst American Ss would also be obtainable; hence the

EFT (or rather, some purely "visual" test of "field-dependence") would provide a reliable indicator of levels of "differentiation". Such an assumption also underlies the work of Berry (1966).

Wober (1967) challenged the view that correlations found between tests for American Ss would also be found amongst Africans. Developing his idea of "sensotypes" (Wober, 1966) he held that "... the finding of a given degree of psychological differentiation might not be so generalised throughout all aspects of an individual's functioning as Witkin's theories suggest." (Wober, 1967, P.29). As an alternative to this, it was Wober's suggestion that "... the prevailing patterns of childhood intake and proliferation of information from the various sense modalities differ according to culture" (Wober, 1967, P.31).

Specifically, among Nigerian Ss, Wober held that there might be a greater degree of "differentiation" evident on tests involving proprioceptive modalities than on tests involving a visual modality only. African culture differs greatly from that of North (Anglo-) America in the relative emphasis on, or "culture-value" of, such areas of activity as rhythm, movement, and dance. Wober therefore administered BOTH the EFT and the RFT to 86 male Ss of a roughly similar level of exposure to Western influences. It was hypothesised that these Ss would have better scores on tests where proprioceptive information had to be dealt with, than (1) on tests involving only visual information, (2) Western Ss on the same tests.

Comparison of the scores of these Ss with results obtained from various studies in the United States revealed the following pattern of findings. In one case, when the body was tilted to the right or left with the frame straight, the performance of Nigerian Ss on the RFT was

significantly better than that of Americans. Thus where only proprioceptive displacements had to be dealt with, Nigerian Ss proved superior. In another case, with both frame and body tilted, comparison of Nigerian with American performances revealed no significant differences in scores. Finally, in a comparison between sets of scores in cases in which the body was upright and only the frame was tilted, American Ss proved superior to Nigerians. Such results give support to Wober's (1967) main hypotheses rather than Witkin's: it appears that the relative degree of development of skills in the different sense modalities varies across cultures.

A further point which emerges from Wober's (1967) results, and which bears out the suggestion of section 4 above, comes from his comparison of EFT/RFT correlations amongst Nigerians with those found amongst American Ss by Gruen (1955). Gruen's (1955) starting point had been remarkably similar to Wober's: "... to determine whether extensive body experiences would alter performance in space-orientation and other perceptual tasks" (P.14). Thus she had compared the performances of 60 professional dancers (persons skilled in the kinaesthetic dimension) with 103 college students on certain tests used by Witkin et al. (1954). The crucial finding of this research from Wober's point of view was that, though for College Ss there were consistently high EFT/RFT correlations, significant EFT/RFT correlations amongst dancers emerged only for the "body-straight" condition of the RFT. Under the "body-tilted" conditions of the RFT, error scores were not significantly related to performance on the EFT. Similarly, among Nigerian Ss, no significant EFT/RFT correlations were found, thus, says Wober, "... showing their closer similarity to American professional dancers than to other American subjects" (1967, P.37).

The general conclusion to be drawn from these results must surely be at least that "... performance in these perceptual tests is mediated along dimensions extending beyond the single field-dependency-independency dimensions proposed by Witkin" (Gruen, 1955, P.14). "Cognitive style" cannot be assumed to be uniformly expressed by all aspects of an S's performance.

In replying to some of these criticisms, Witkin (1967) has pointed out that in Wober's (1966) study, one significant correlation between the RFT and a purely visual measure of "field-dependence" had been found; and it is true also that all Wober's (1967) Ss were males whom we would expect to be more "field-independent". However, Witkin does agree that the idea of sensotypes is "... a hypothesis which clearly merits further inquiry" (1967, P.241). This is the principal argument of this section: that the "orthodox" Witkin view of "field-dependence" cannot be accepted out of hand: the situation is more complex than has been supposed.

(b) confounding of socialisation and ecological factors: a closer look at Berry's (1966) findings

Perhaps the single most significant study of an aspect of the complex relationships between culture and perception is that of Berry (1966). Although this provides partial support of the theory of "field-dependency", it seems to me to add complications to the interpretations of the theory cross-culturally, and it is of note that Berry exercises considerable caution in drawing conclusions from his results.

The basic elements in this study have already been outlined (pages 11-13 above). Berry was concerned to demonstrate the existence of differences in perceptual skills between the ethnic groups he chose to study, and to relate these to antecedent cultural factors. There were

six subject samples, obtained respectively from relatively more "traditional" and relatively more "transitional to Western" settings in three cultural groups: The Scots, the Eskimo, and the Temne. In all samples, an attempt was made to test males and females in equal numbers, and to sample equally from five age groups: 10-15 years, 16-20, 21-30, 31-40, and above 40 years. Data were collected on the number of years, and type, of education of all Ss, and visual acuity was strictly controlled. The dependent variables (test scores) were as follows: Discrimination skill, assessed by measuring the threshold for identifying (and reproducing in drawings) gaps in simple line shapes which were presented tachistoscopically; and Spatial skill, assessed by four tests: Raven's Coloured Matrices, Morrisby Shapes, Kohs Block Designs, and the Within EFT (with six figures only).

Berry's hypotheses in conducting this study were based on a thorough examination of the cultural and ecological characteristics of each subject sample. The principal points of comparison were between the Eskimo and Temne groups. Firstly, while the Eskimo environment represents a homogenous and uniform stimulus "field", that of the Temne is "highly variegated", with many varieties of vegetation and undulations of terrain. Secondly, child-rearing practices differ considerably between the two groups: Temne children, after an initial period of indulgence, are treated very harshly and frequently beaten; Eskimo children are treated permissively, and punishment is rare. Thirdly, the Eskimo are a hunting and fishing people who accumulate little food; the Temne are rice, groundnut, and pepper farmers. Hence the study provides an additional test of the thesis of Barry, Child and Bacon (1959) mentioned above. Finally, an abundance of minor differences exists between the two groups, for example, while the Temne practise polygamy, the Eskimo no longer do;

While the Eskimo have maps, the Temne do not; the Eskimo have developed a variety of arts and crafts, and a script of their own, whereas the Temne's achievements in this respect are less impressive, and the only script widely used, Arabic, was imposed from without; and while the Eskimo have developed a rich vocabulary of spatial terms, no such elaboration of space is found amongst the Temne.

Berry's (1966) first prediction, that, despite equivalent acuity, the Eskimo would be significantly more aware of small gaps in tachistoscopically presented material, was substantially borne out by his findings: the mean gap size first seen by the traditional Eskimo sample was less than half that value for the traditional Temne sample. This confirms the hypothesis that the ability to observe small detail would be more highly developed in an ethnic group whose survival depends on observing minute changes in a homogenous environment; and underlines the striking effect of ecological factors in the development of perceptual skills.

With regard to Berry's hypothesis on spatial ability, a similar pattern emerges. The results showed conclusively that (i) the Eskimo scored significantly higher than the Temne for comparable degrees of Westernisation; (ii) the Eskimo scores were closer to the Scottish scores than were the Temne scores; (iii) Temne and Eskimo transitional, more westernised samples scored higher than the respective traditional samples; and (iv) in each sample, spatial scores were related to level of education, with the exception of Kohs, EFT and Matrices in the traditional Eskimo sample, and Kohs and Matrices scores in the Temne traditional sample. A fifth hypothesis, that those rating themselves more severely disciplined would have lower spatial scores than those less severely disciplined, was supported by 7 significant t-tests out of 24.

(c) Criticism of Berry

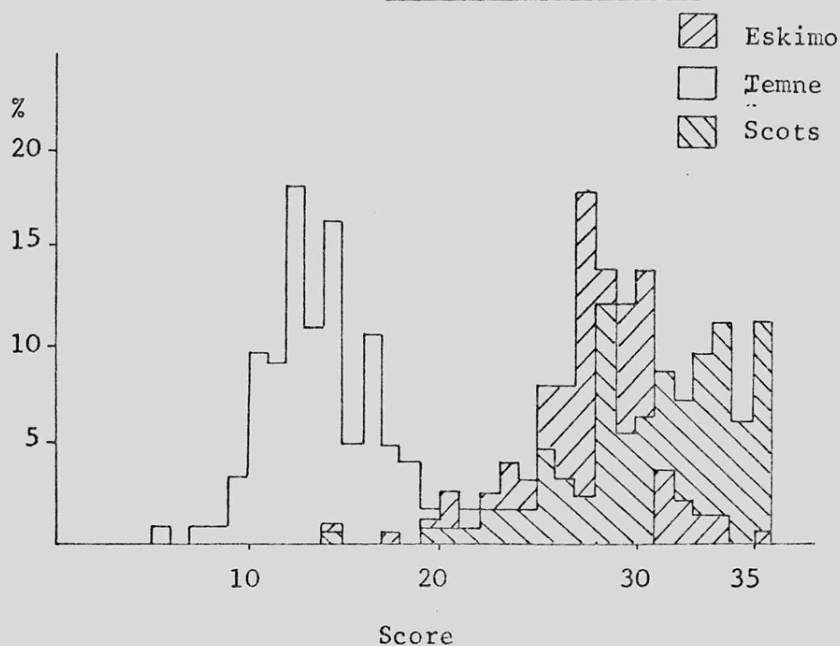
One point emerges immediately from these findings. That the Temne and Eskimo differ markedly in spatial skills and "field-dependence" scores cannot be denied;; and that ecological factors and educational background play a substantial role in determining such scores seems obvious too. The one inconclusive section of the findings is that which seems to relate spatial scores to family discipline experiences. Yet reviews of this study have regarded this as the crucial finding, and have disregarded nearly all else. Thus we have Witkin (1967) reporting that "... the impressive differences in child-rearing emphases between the Temne and Eskimo were reflected in differences in perception by members of the two societies...." and later that "... differences in the ecological requirements of the two groups contributed further to Berry's expectation of greater field-independence among the Eskimo" (1967, P.240). Similarly, Jahoda (1970), in outlining Berry's work, described the logic thus: "The Temne bring up their children harshly, with a strong emphasis on obedience and conformity; the Eskimo, on the other hand, are highly permissive and seldom use punishment. Accordingly Berry predicted...." (1970, P.9), and notes later that "... the story has further complications regarding ecology, into which it is not possible to enter..." (Jahoda, 1970, P.9). Reviews must of necessity remain superficial; nevertheless they should not reify possibilities into certainties.

A second point which might be made concerning Berry's (1966) study focuses on its main weaknesses, namely that the respective roles of ecology, education, and socialisation have not been pinpointed. Of this Berry is fully aware in his conclusion: "It has not been possible, though, to unravel the respective contributions of the ecological demands and the

cultural aids, but it is apparent that the cultural characteristics developed by the respective societies DO NOT INHIBIT the development of the skills required by their environments." (1966, P.228). He freely allows for the possibility that other factors too may be involved. Thus it does not seem to me that any conclusion concerning causal relationships between family experiences and perceptual skills is yet permissible. (That a process of influence is at work, would seem to be the case; but it would also seem that other factors have a stronger influence.)

However, the following points may be considered. Firstly, ecological factors probably contribute in very large measure to Eskimo skills (cf. the clear-cut findings on discrimination ability). Secondly, it seems possible that intelligence could have played a part in these findings: for two reasons: (i) comparisons of scores distributions in all samples on Kohs Blocks and Raven's Matrices reveals very little overlap between Temne and Eskimo distributions (Figure 3) - the Eskimo and Temne samples were

Figure 3: Matrices distribution in
Berry's (1966) work.



simply not matched on intelligence; or perhaps the Eskimo have an advantage with paper and form materials; (ii) while correlations between EFT and matrices are highly significant ($p < .01$) amongst the Eskimo and Scottish samples (p.218) the corresponding correlations for the two Temne samples are 0.23 and 0.15 respectively. Does this not suggest there are different levels of "intelligence" amongst the different samples, as well as different patterning of abilities? Thirdly, the Eskimo language, which Berry considered as a determinant of perception, has a much larger stock of spatial items than the Temne. Finally, apart from the evidence produced which directly suggest the importance of education is there not indirect evidence too? The Scottish sample show a high degree of "differentiation" and spatial skill; yet discipline in Scotland, though hardly so harsh as amongst the Temne, is certainly not as lax as amongst the Eskimo. Perhaps the reason is in the significant correlations between educational background and spatial scores in the Scottish sample.

When these points are considered together it seems to me that the cross-cultural theory of "field-dependency" by no means provides a coherent system by which differences in EFT scores can be understood. The complexity of relationships between "field-dependence" tests and a number of cultural factors is beyond the scope of the theory in its present form. The next two sections assess some further evidence bearing on the point that "socialisation", held to be of paramount importance by Witkin and his colleagues (1962), accounts for much less than these researchers contend.

(d) the role of intelligence

It has been observed by Vernon (1969) that the characteristics of the more "field-independent" child as described by Witkin et al. (1962)

coincide with those generally attributed to the more generally intelligent child. "A serious weakness of Witkin's findings", continues Vernon, "is that many of them could have derived from the g rather than the k component of his tests" (1969, P.64). Thus it has been widely recognised that "field-dependent" subjects "... tend to perform less effectively on standard tests of intelligence than 'field-independent' subjects." (Goodenough and Karp, 1964, P.254). The situation, however, is not so simple.

A straightforward estimate of the truth of Vernon's (1969) statement quoted above is not available, because American research into the factorial structure of intelligence does not seem to use the concept of 'g'. Thus it is in fact almost impossible to work out the relative roles of 'g' and 'k' in the determination of "field-dependence" scores; obviously the two must interact since the latter is (according to Spearman) a component of the former. The work of Witkin et al. (1962) attempted to explore the nature of the link between "field-dependence" and intellectual functioning, by a series of factor analyses, and by investigations of the relationships between "field-dependence", insightful problem-solving, the ability to overcome set, and so on. For example, when two groups of 13 Ss each, one very "field-independent", the other very "field-dependent" (on EFT and Kohs Blocks) were compared in their relative degree of success in solving two insight problems, it was found that while 12 of the "field-independent" Ss solved both problems, 11 of the "field-dependent" Ss failed both. This possibly points to a considerable role for 'g' in the performance of "field-independent" tasks.

The two most widely used indicators of "field-dependence-independence" in cross-cultural research are the EFT and Kohs Blocks. Vernon's own (1969)

studies with these and many other tests revealed a substantial 'g' factor and only a lesser 'k' factor in performance on both these tests. Amongst his Eskimo subjects, for example, the respective loadings 'g' and 'k' on the EFT (the Gottschaldt version) were 0.72 and 0.36, on Kohs blocks, 0.68 and 0.53. This is worrying from the viewpoint of Berry's (1966) findings, particularly since his Eskimo Ss had much higher matrices scores than his Temne Ss. With regard to the Gottschaldt Embedded Figures, Vernon has noted that "... no evidence was obtained that the "field-independence" which it is supposed to measure can be differentiated from spatial or visualisation factors" (1969, P.142); and Kohs Blocks is, amongst younger Ss, mainly a test of general intelligence.

A separate school of thought, however, has discovered the influence of intelligence on "field-dependence" scores principally in terms of the 'k' factor. Supporting this is the evidence summarized by McFarlane-Smith (1964) who sees a strong link between "field-independence" and spatial ability; the factor analyses of Witkin et al. (1962); and the work of Goodenough and Karp (1964), which found that the only substantial factor loadings for the EFT and the RFT, when related to WISC performance, were on factor III, the "spatial-perceptual" factor associated with the sub-tests of Block Designs, Picture Completion, and Object Assembly.

Thus the empirical evidence on the roles of 'g' and 'k' is equivocal; both must certainly be involved; but a point to note is that "field-dependence" involves 'g' not simply via the 'k' factor, but also in a more general way. A useful scheme for relating the "field-dependence-independence" dimension to other aspects of intelligence and to anthropological and sociological data has been put forward by Vernon (1969, P.86). Examining background material which has attempted to relate

economic and cultural factors to personality processes, (e.g. Barry, Child & Bacon, 1959; and the work of Max Weber), Vernon has taken an additional step and has tried to show the implications of these for cross-cultural work on intelligence. Figure 4 shows his scheme with the "field-dependence-independence" dimension placed diagonally. It might be said in criticism that the dimension looks slightly redundant here, since it merely expresses a relationship (between 'g' and 'k') allowed for by the ordinate and abscissa respectively.

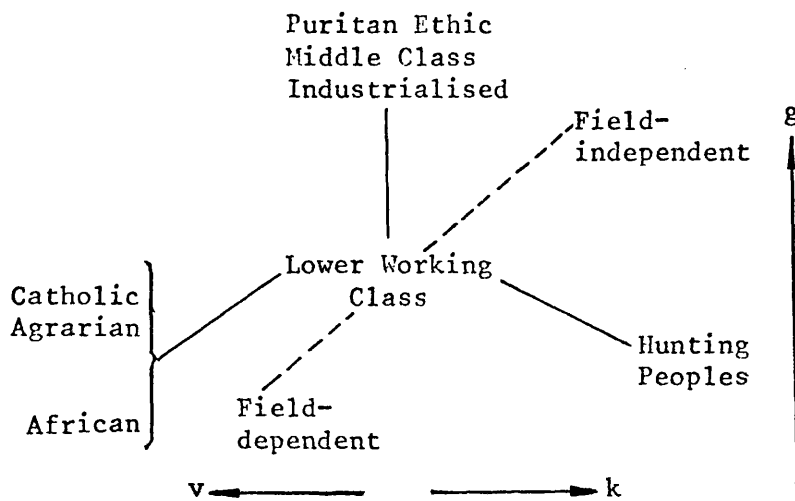


Figure 4: Vernon's (1969) scheme of Intelligence in relation to Culture.

Thus it seems to me that three points need to be made concerning intelligence. First, there certainly is a substantial component of 'g' in "field-dependence" tests, and unless it is considered in the cross-cultural use of these tests, their results will be difficult to interpret correctly. Secondly, the relationships between 'g' and 'k' and "field-dependence" are not at present clear; indeed we cannot be sure that the last is distinct from the interactions of the first two. Thirdly, until

the role of intelligence is more fully understood, the role of factors like personality organisation and family experiences will remain difficult to assess.

(e) the role of education

If we agree with Goodnow (1969) that the two main aims of cross-cultural research are (i) "pinning down the nature of a difference in skill" and (ii) "to connect the difference in skill to a difference in experience", then our research will as a result seek to evaluate the roles of as many different factors as possible in acting on our dependent variables. The difficulty with the factor of "education" or "formal schooling" is that it is itself a cluster of variables. Apart from the obvious roles of the topic being taught, the manner of teaching, the language which is used, and so on, there are many other aspects of the educational process which have great impact on the learner. Vernon (1969) has attempted to deal with some of these, such as the amount of space per pupil, the quality of equipment, degree of parental interest in schooling, the length of schooling - the list could be endless. Berry (1966) observed that Arabic schools among the Temne "... familiarise students with the basic classroom demands (shared with the testing situation) of sitting still and responding to questions, as well as introducing them to pictorial and graphic material" (Berry, 1966, P.225). But by and large, cross-cultural studies of the effects of education on "field-dependence" have focused simply on the more large-scale effects of the process, that is, whether or not Ss have been to school, and if so, for how long.

It cannot be doubted that the experience of formal schooling influences scores on tests of "field-dependence", thus suggesting the role

of a further factor in complicating the orthodox theory of "psychological differentiation" (Witkin et al., 1962) and implying that its range of application is not as wide as it originally seemed.

For example, Berry (1966) found a strong, positive relationship between education and spatial test scores, particular in his two Scottish samples and in the two transitional samples where Ss had ready access to western education. Performance on Western psychological tests would seem to be radically influenced by the presence of Western education: of 22 valid correlations, 17 were significant beyond the .04 level. Weber (1967), in a sample in which the correlation between the EFT and the RFT was not significant, found the EFT was significantly correlated with educational level. This result is in contrast with the findings of Okonji (1969), showing an indirect effect of education. (1) Amongst undergraduates in a Nigerian university, a sample brought up in urban literate homes were significantly more "field-independent" on the RFT than a sample from rural illiterate homes; (11) on EFT scores, there was a significant interaction between urban-rural background and degree of literacy of parents. This result is particularly interesting, since it shows how the two variables, urban-rural differences (which were essentially differences in child-rearing), and level of parental education, had a combined influence on EFT scores. (Unfortunately, while Okonji's clearest findings were with the RFT, Weber (1967) found no relationship between the RFT and educational level.) Finally Siann (1972), working with Zambian Ss, found that the correlation between the EFT and a verbal test was significantly higher than that between the EFT and the RFT. This result, she contends "... is more consonant with a general educational account of ability on EFT than with a personality mediated account of a basic underlying analytic approach" (1972, P.93).

Two other points may be made concerning the role of education.

First, the effects can be felt clearly on spatial tests as much as on those of the 'visid' factor. McFie (1964) administered six WISC sub-tests, amongst them Kohs Blocks, to African Ss in a technical training college, and retested them two years later. The largest increase occurred on Kohs Blocks, an effect which McFie attributed to the Ss' experience with shape and space in their technical training. Second, educational processes in Africa seem particularly to affect an S's willingness and ability to deal with form. In a study of the preference for colour over form in Zambia, Serpell (1969a) found that "... educational attainments and/or mental age are more important determinants of form-dominance than chronological age" (Serpell, 1969a, P.8).

The importance of the factor of education in performance of spatial and "field-dependence" tests seems to me to be amply demonstrated by these findings. Clearly it is a factor which the theory of "psychological differentiation", in its present form, does not take into account. There seems to be a point of view, originating in this theory, that child-rearing practices are of paramount importance and that ecological, intellectual, and educational factors are unfortunate overtones which conceal the main effect. My own theoretical position is that, not only do these factors require much more investigation, but also that the basic underlying contention of the unity of the "differentiation" dimension is highly questionable. In the last section of this chapter I present some interesting and fairly recent alternative hypotheses which must certainly supplement, and may indeed replace, the single concept of "differentiation". The crux of the argument is simply this: that if a theory has been stretched too far, and cannot account for the data it purports to account for, then alternative theories ought to be entertained, or the theory largely modified.

5. Alternative Hypotheses to the "field-dependency" theory

In this section, various papers are discussed which have found meaningful relationships between scores on "field-dependence" tests and other variables not included within the scope of the "field-dependency" theory. The main purpose of including these is to illustrate the point that there may be available better explanations for the phenomena of "field-dependence" than that proposed by Witkin et al. (1962) with which the present thesis takes issue. These possibilities are dealt with under two main headings, (a) laboratory, and (b) cross-cultural.

(a) laboratory

(1) "arousal"

The key by which the concept of "arousal" is linked to that of "field-dependence" is the idea of NARROWED ATTENTION. A small number of studies have put forward the suggestion that an increase in physiological "arousal" leads to a reduction in responsiveness to peripheral cues (Easterbrook, 1959). This "narrowing" or "focusing" of attention is akin to a more "field-independent" orientation towards the environment. If such a link exists, then we should expect that the experimental manipulation of "arousal" should lead to changes in attention and in "field-dependence" scores.

These expectations are fulfilled by experiment. Callaway (1959) found, for example, that increases in arousal due to the influence of drugs facilitated performance on a test involving embedded figures. Oltman (1964) compared performances on the RFT under two sets of conditions: (1) the normal 'quiet' condition; (2) under circumstances in which white

noise was delivered to Ss through headphones. Error scores under the two conditions differed significantly ($p < .005$), performance being more accurate on the 'noisy' trials.

If more experiment were to be channeled in a direction such as this, the results might make an "arousal" theory of EFT or RFT performance more plausible: for here a direct relation has been exhibited between the introduction of certain stimuli and performance on the tests. Further, there are certain indications that "field-dependent" and "field-independent" Ss differ in the degree to which they become aroused, for example, under conditions of sensory deprivation (Silverman, Cohen, Shmavonian, and Greenberg, 1961). "Arousal", despite difficulties of definition, seems to me to be a concept of greater heuristic merit than that of "differentiation".

However, the most obvious merit of the concept of "physiological arousal" when applied to individual differences in "field-dependence" become apparent when the concept is applied to the systematic study of sex differences. Broverman, Klaiber, Kobayashi, and Vogel (1968) have put forward the hypothesis that differences between the sexes in "field-dependence" and in a number of other cognitive abilities are related to sex differences in physiological functioning. For example, a vast amount of literature has consistently shown that females' performance is superior to males' on "simple, overlearned perceptual-motor tasks", whereas the reverse is the case "on more complex tasks requiring an inhibition of immediate responses to obvious stimulus attributes in favour of responses to less obvious stimulus attributes" (Broverman et al., 1968, P.23). These authors seek to explain these differences in the different relationships existing between activation and inhibition systems in the

autonomic nervous system. Unfortunately, their suggestions are not compatible with the findings of Callaway (1959) and Oltman (1964) quoted above; but the main points seem to me to be that there is here a plausible, valuable alternative to the "differentiation" concept of Witkin et al (1962).

(ii) Selective attention

This section is almost purely speculative, and aims to show that the observed individual and sex differences on "field-dependence" may be due not to differences in the ability to focus on certain aspects of the environment, and ignore the field as a whole, but rather to differences in the category of stimuli to which Ss will pay attention.

For example, Fitzgibbons and Goldberger (1971) have described a number of studies in which "field-dependent" and "field-independent" Ss have been shown to differ in their relative orientations towards different aspects of the environment. "Field-dependent" children perform better on a task administered by an "approving" E than on one administered by a "disapproving" E; "field-dependent" Ss show better incidental memory for human faces; female infants produce longer fixation times for human faces than do male infants; and generally, "field-dependence" is associated with selective attention for stimuli of a social nature. "Field-independent" Ss, on the other hand, are more task-oriented, and have better incidental memory for non-social stimuli.

These results have two implications. First, if females, or more "field-dependent" subjects, focus attention on stimuli other than that involved in the standard tests of "field-dependence", then the results of these tests for these and more "field-independent" subjects are not really comparable. "Field-dependence" is not a unitary dimension. Second, the influence of factors involved in the task situation seems to be very

marked indeed; for example, results are sensitive to sex of E as well as to sex of S, and to whether E is "approving" or "disapproving". This lowers the reliability of the tests, and suggests the "field-dependence-independence" dimension is even more complex than previously suggested.

(iii) sex differences

The aim of this section is merely to make a note of further suggestions of recent research, namely that sex differences in "field-dependence" may be due not to variations in "differentiation" or ability to "separate an item from an embedding context", but to the fact that the tests of "field-dependence" may be measuring different kinds of performance in men and women respectively.

It has been pointed out several times in preceding sections that not only are women more "field-dependent" than men, but also that their scores are less consistent on the different tests of the dimension; and further that the personality correlates of RFT and RFT scores may not be the same for each of the sexes. An experiment with the RFT conducted by Morf, Kavanaugh and McConville (1974) has suggested that these results may be explained by the fact that performance in men and women is a function of different determinants. 54 male and 44 female Ss were given the portable RFT and the Jackson Personality Inventory. A notable feature of RFT administration was that 16 trials rather than the usual 8 were given, and separate scores were calculated for the first eight and the second eight trials respectively. RFT and J.P.T. scores were correlated.

The results of this experiment suggested that (i) men's level of performance on trials 1-8 of the RFT is a function of different determinants from that on trials 9-16; (ii) while "... arousal appears to be a useful construct in explaining the RFT performance on the men", "... an interpretation in terms of passivity, low energy level, and uniformity... ..appears more appropriate for the female Ss" (Morf, Kavanaugh and

McConville, 1971). Thus it would seem that the demands of the RFT are not the same at all points in its administration, and that the personality correlates and physiological factors related to performance are different between the sexes. In addition, a developmental study of sex differences in responses to embedded figures suggests strongly that the results obtained from perceptual tests may be task, age, and sex-specific. Immergluck and Nearini (1969) working with Italian Ss, found that the ontogenetic pattern of sex differences on the Gottschaldt EFT was by no means a simple one: for example, they found females to be superior at the 9-year age level, and no significant sex difference at ages 11 and 13. I endorse these authors' conclusion that "sex differences, as far as ontogenetic development is concerned, appear to be task and response specific" and "... both the mechanisms and psychological meaning underlying... discrete perceptual response classes might be different at varying age levels" (P.220). And I would add that a similar caveat applies in the context of sex difference.

Taken together, the points raised in the preceding sub-sections indicate that "psychological differentiation" may be only one of a number of ways of explaining the individual differences to which Witkin et al. (1962) address themselves. Again I wish to make the point that until other explanations have been discounted, the theories of "field-dependency" cannot be unreservedly accepted. As the next section suggests, this state of affairs also exists with reference to the cross-cultural data on "field-dependence".

(b) cross-cultural

(i) ecology, visual experience and language

The point has been expressed in section 4(b) above that the cross-

cultural study of Berry (1966) provides much more substantial support for an account of cross-cultural differences in "field-dependence" in terms of ecological and linguistic factors, than in terms of Witkin's "socialisation" hypothesis. While the ecological and socialisation factors must to some extent work together, it is the contention of the present thesis that the former must be of primary, and the latter of only secondary importance. The reasons for this, to be outlined more fully in the next chapter, centre on the view that the variables most likely to influence the visual skills of a society's members are the visual experiences to which they are subject; and that even if this is not the case, then it ought to be eliminated as a determining factor before an explanation based on family experience is accepted.

(ii) intelligence and education

Finally, studies discussed in sections 4(c) and 4(d) above have indicated that the respective roles of intelligence and education in the determination of "field-dependence" scores are not at present understood, but would seem to be more significant than existing cross-cultural work has recognised. Again, it is contended here that these factors may well be the primary ones underlying variations in "field-dependence" scores, and that until such a possibility has been more fully explored, the "socialisation" hypothesis of Witkin and his associates will not rest on a secure foundation. Accordingly, methods are described in Chapter II by which at least some of these aspects which contribute to determination of "field-dependence" scores may be experimentally investigated.

CHAPTER 2:

THE CONTEXT OF THE PRESENT THESIS

CHAPTER 2.1. Review and perspective on the theory of 'field-dependence'.

A summary of the points set forth in the preceding chapter, which are my specific reasons for disquiet concerning the theory of 'field-dependence', is presented in Table 2. Taken together, I think they leave no room for doubt over Vernon's (1969) contention that "...a great deal more research is needed to map out a clearer taxonomy of field-dependence" (1969, P.61). What are the features of this "taxonomy" which most require attention?

TABLE 2: SUMMARY OF STUDIES INDICATING PROBLEMS IN 'FIELD-DEPENDENCY' THEORY.

Nature of problem	Source
(1) EFT performance improves with practice	Djang, 1937; Hanawalt, 1942; Braly, 1942; Kolers & Zink, 1962.
(2) EFT is inconsistent in relation to personality	Dana & Goocher, 1959
(3) RFT performance may be unstable	Cohen & Tepas, 1958; Goldstein & Chotlos, 1966; Oltman, 1964; Jacobsen, 1964; Wolf, 1965.
(4) RFT administration varies in relation to 'experimenter'-type effects	Lester, 1968, 1971;
(5) Questionable validity of Witkin et al's (1962) interview methods	Yarrow, Campbell & Burton, 1964; Zurich, 1962.
(6) The 'field-dependence-independence' dimension may not be stable	Gruen, 1955; Wober, 1967.
(7) Sex differences in EFT scores are- (a) not consistently found (b) subject to the influence of different sets of factors	Goldstein & Chance, 1965; Immergluck & Mearini, 1969; Fitzgibbons & Goldberger, 1971.
(8) EFT scores are substantially influenced by: (a) ecological factors (b) intelligence (c) education	Berry, 1966; Okonji, 1969; Siann, 1972.

(a) Complexity of 'field-dependence' and roles of other factors.

Firstly, the suggestion that the correlations which are the basis of the 'field-dependence-independence' dimension might not be found to hold in cultures outside North America must be taken seriously. In other words, research ought to use at least both the EFT and the RFT if it is to be fully reliable. An illustration might serve to make this point. It is well known that Berry (1966) found no sex differences on EFT performance amongst his Eskimo sample; this result, bearing out a prediction based on the nature of socialisation processes, is taken as clear support of 'field-dependency' theory. But Okonji (1969), in Nigeria, also found no sex differences on EFT performance amongst his Ss. These results (given the nature of socialisation processes in Nigeria) might prove rather awkward to interpret in terms of the theory but for the fact that Okonji also used the RFT, and did find significant sex differences on this. One asks, what might Berry's results have been had he used the RFT? As it is these results conform roughly with theoretical predictions; but the state of affairs remains unsatisfactory in the absence of RFT scores.

Secondly, the roles of a number of cultural factors ought to be taken into account - not ~~simply~~ those which E expects will be the principal determinants of his Ss' scores. Particularly, the roles of intelligence, language, education, and experience with stimuli similar to the test materials ought to be carefully investigated. The following sections of this chapter describe one attempt to do this using the cross-cultural method of investigation.

(b) My use of the cross-cultural method

The use of the cross-cultural method here follows roughly the lines mapped out by Berry (1966) and by Dawson (1967a,b) and outlined by

Jahoda (1970). These researchers "...started with an observed correlation within a Western culture, and then selected non-Western ones in which the presumed independent variable existed at one or other extreme of the range, predicting specific consequences in terms of the dependent variable" (Jahoda, 1970, P.9).

Thus the sample to be used for the purposes of the present thesis was selected with the following factors in mind. The aim of the research was to demonstrate that a larger degree of individual variation in 'field-dependence' scores, particularly on the FFT, could be accounted for in terms of (i) visual experience, (ii) intelligence, (iii) education, than could be accounted for in terms of socialisation and family experiences. The original intention, in fact, was to find a sample in which the socialisation practices would tend, according to Witkin et al. (1962) and Witkin (1967), to produce 'field-dependent' Ss; and subsequently to show that, by virtue of other factors in their environment which could be pinpointed, that the scores of these Ss were, in fact, 'field-independent'. For reasons which will be elucidated below, Hong Kong Chinese were chosen as most likely to provide these required conditions amongst testees. In a sense, the thesis is balancing two hypotheses against each other: by selecting a sample in which family experiences make for 'field-dependence', who live in stimulus conditions making for 'field-independence', I hoped that examination of the dependent variables would reveal the relative degree of influence of the two sets of factors. (To fully explore the question, a number of samples from a variety of different cultures would be necessary.) Section 2 discusses the combination of reasons for selecting a Chinese sample in this instance.

2. Reasons for choice of Chinese Sample

(a) Child-rearing practices

The first reason for the choice of a Chinese sample was the idea that child-rearing practices in Chinese society would closely approximate those described by Witkin et al. (1962) as likely to foster a 'field-dependent' perceptual style. Much of the evidence on which this reasoning was based was of necessity indirect; and I fully realised in advance that some investigation of this factor would be desirable in Hong Kong itself.

The characteristics of rearing procedures likely to foster 'field-dependence' have been studied by Seder (1957) and by Witkin et al. (1962). Such characteristics are for convenience labelled "indicators inhibiting differentiation", or IID. In their research on this topic, Witkin and his colleagues (1962) concluded that the maternal attitudes likely to "inhibit differentiation" in the child were as follows: (i) a possessive attitude of the mother towards the child - intense emotional involvement; (ii) an attitude of anxiety and solicitousness; (iii) a cold, unsympathetic, hostile attitude; or (iv) an inconsistent approach, alternating between over-indulgence and hostility. Of particular interest were the methods used by mothers of 'field-dependent' children for control of aggressive or assertive behaviour in the child: these were either (i) indulgent and submissive; (ii) severe and coercive; (iii) a combination of the first two; or (iv) irrationally threatening.

Seder's (1957) work had found a similar pattern of behaviours to be characteristic of the mothers of 'field-dependent' children. The most important of her findings concerning the nature of the parent-child-interaction were as follows: firstly, 'field-dependent' Ss had been subjected to child-rearing procedures which place great stress on conformity

and authority; secondly, these Ss had been harshly trained in aggression-control; thirdly, their tendencies towards self-assertiveness and independent mastery of the environment had been inhibited or suppressed.

Now although empirical evidence showing that these conditions or similar ones exist in Chinese families is lacking, there is available some indirect evidence which suggests that child-rearing practices in Hong Kong would manifest "indicators inhibiting differentiation". The characteristics of the so-called traditional 'Confucian family' as these have been described by social anthropologists bear a great resemblance to those which, according to Witkin and Seder, would tend to produce 'field-dependent' children. The Chinese kinship system is extremely complex, with over 400 terms in the language which refer to features of familial relations. "In the peasant family it was taken for granted that a child would and should grow up to be much like the parent of the same sex and to carry on the same activities" (Winch, 1963, P.36). Furthermore, "...In the Chinese society, filial piety should be singled out as the most fundamental social value having determinating influences on the functioning of the whole society, not just the family" (Wong, 1970, P.170). These tendencies towards extreme conservatism, coupled with a system in which a child's marriage was arranged by his or her parents, necessarily involve the inhibition of any marked tendencies towards self-assertiveness. Also, in the traditional family, punishment for transgressing the rules of normal family life were extremely severe, including such measures as flogging, ostracism, and even on rare occasions, execution (Lee, 1953).

To expect that such conditions prevail in the families of Urban Hong Kong today would of course be extremely naive for a number of reasons. Firstly, in 1949 communist China undertook a radical programme of re-organisation in the family structure, which spread to Hong Kong in the

fifties; this led to a crisis in China in 1956, with delinquency at an extremely high level, and subsequent programmes for family reform became more moderate. Secondly, Hong Kong today is highly Westernised, and the younger members of the population are rapidly adopting Western attitudes and ways of life: "...filial piety has gradually lost its significant influence over family living....Parents are aware that traditional types of home discipline cannot be exercised effectively" (Wong, 1970, Pp.172-4). Thirdly, it seems to be the case that probably only the more enterprising (and perhaps more 'field-independent'!) members of the Chinese population found their way to Hong Kong in the first place.

Against these arguments one can, however, place several equally valid points which suggest that, although the 'Confucian' family concept is no longer applicable to social structure in Hong Kong, the parental attitudes and child-rearing procedures which are associated with it may still exist to some extent today. First, such aspects of a culture as procedures associated with child-rearing are by no means susceptible to rapid change. Second, samples of Ss at school or university in Hong Kong today are the children of parents who were themselves probably reared in traditional Chinese families, and who will exercise child-training methods similar to the ones which they themselves have experienced. (The youngest S in the present study was born in 1961.) Third, though as Wong (1970) points out family life is becoming Westernised, and more children are sent to English-speaking schools than to Chinese ones (in the ratio 4:1), there still remains a substantial number of children who speak no English, and who as far as one can see come from more 'traditional' backgrounds. Fourth, Caudill and Weinstein (1969) have provided some empirical evidence on processes of child-training in Japan, which is essentially similar to Hong

Kong in having possessed a traditional culture very similar to that of China, which is now in a process of transition towards Western-style values and social structure.

Caudill and Weinstein's (1969) investigation focused on the "fine grain" of similarities and differences in maternal care and infant behaviour between Japan and the United States. Two groups of 30 infants each, one Japanese, the other American, were matched as far as possible in social-class origin, occupation of father, etc., in order that 'culture' as far as possible would remain the single independent variable. The behaviour of each infant and the mother-infant (or caretaker-infant) interaction were observed during an extremely thorough time-sampling procedure over a total period of five hours for each infant. Behaviour was observed according to a pre-arranged system of 40 categories, including such points of information as the location of the infant in relation to the mother, the infant's activity, vocalisations, feeding behaviour, caretaker behaviour, and so on. (In 90% of all cases, the caretaker was the mother.) Finally, the results on 12 "infant" and 15 "caretaker" variables were analysed for cultural similarities and differences.

It was found, firstly, that the types of behaviour in which there were no cultural differences were those which were clearly concerned with biological needs, for example, amount of time awake, food intake, and so on. "Beyond this, however, the differences lie in the styles in which infants and mothers behave in the two cultures" (Caudill and Weinstein, 1969, P.29). Thus, for example, while the American baby is physically active and happily vocal, the Japanese baby seems much more subdued in all respects. The American mother has a more lively, stimulating approach than that of the Japanese, for whom playing with the child is closely

associated with soothing behaviour. These and a number of related differences between the cultures support the authors' hypotheses that "...in Japan, the infant is seen as a separate biological organism who from the beginning, in order to develop, needs to be drawn into increasingly interdependent relations with others. In America, the infant is seen as a dependent biological organism who, in order to develop, needs to be made increasingly independent of others" (Caudill and Weinstein, 1969, P.15).

If it is a fair assumption, and it seems to me that it is, that the characteristics of infant care found in Japan will be similar to those in Hong Kong, and that the latter will be at least substantially different from those of the United States, then it is reasonable to suppose that the characteristics of child-rearing amongst Hong Kong Chinese will be those which make for the development of a more passive, dependent individual. If in addition Witkin et al's (1962) theories concerning individual development under such circumstances are valid, then we should expect typical scores on spatial-perceptual tests amongst the Ss to be relatively more 'field-dependent'. Though this interpretation involves some difficulties, e.g. concerning the question of the relationship between maternal behaviour toward a three-month-old infant and that toward a three-year-old child, I nevertheless think it reasonable to accept the conclusion that amongst Hong Kong Chinese, the processes of child-rearing are those which Witkin et al. (1962) would describe in the category of "indicators inhibiting differentiation".

(b) Visual experiences

The second initial reason behind the choice of a Chinese sample lies in the nature of specific visual experiences to which Chinese Ss are

exposed. These experiences arise not from ecological factors like 'degree of articulation of the environment' but rather from the nature of the Chinese written language.

(1) The Chinese language in Hong Kong

The Chinese written language is based on a system of "characters" or ideograms not used in the West. These are thought to have originated in a mode of pictorial representation of the environment, but the relationship of most modern characters to original pictographic forms has been obscured by history (Diringer, 1948). Chinese lexicography divides the characters into six main classes, but it is to be noted here that the vast majority of characters in everyday use come from only one of these classes, the sixth. The classes are (1) pictograms, simple characters based on a likeness of shape to objects; (2) indicative characters, in which abstract ideas are expressed by ideograms borrowed from other words similar to them in meaning; (3) suggestive compounds or "assemblies of ideas"; (4) deflections and inversions, by which the meanings of some words are indicated using the character for another word which has been slightly altered in position; (5) "borrow-help" characters, which are interchanges of characters similar to homophones; and (6) the "Hsing sheng" or phonetic compounds, the most frequently used category, which consists of two parts, a phonetic and a denotative component.

A number of points should be made concerning these characters, to explain why I hold them to be such important aspects of Chinese visual experience.

First of all, the sixth class of characters, phonetic compounds, consist, as has been said, of two parts. One of these, the phonetic element, gives the rough pronunciation of the word; the other, the

determinative or denotative element, gives the meaning of the word (Diringer, 1948). The second element may be placed "...above or below, inside or around, to the right or the left, of the other element" (Diringer, 1948, P.115). It seems reasonable to suppose that the consistent reading of such characters would involve a process slightly different from that involved in reading alphabetic scripts; for example, a higher level of discrimination skills would seem to be necessary, coupled with the ability, developing with the process of language acquisition, to sort the characters into their respective parts.

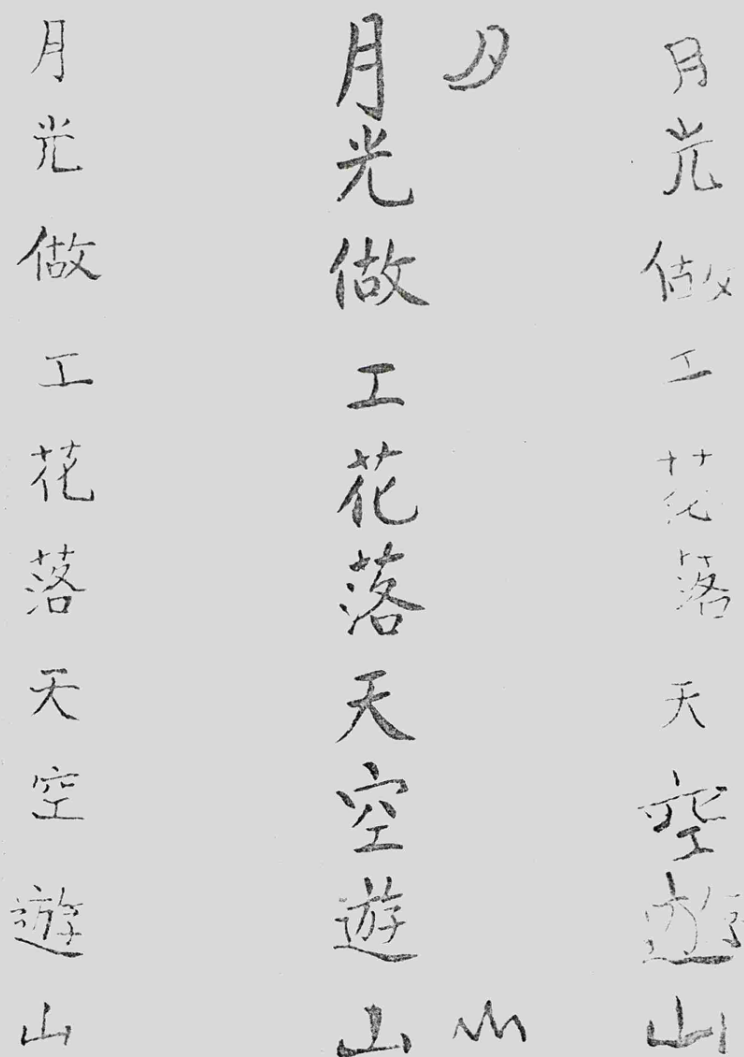
Second, a further type of "stimulus-sorting" seems to be involved in the reading of Chinese. Kvan (1969) has argued that the meaning of a Chinese character is much more dependent on other characters in a sentence, in the whole of the context, than is the case with the word-units of an alphabetic script. The Chinese written word, he points out, "...is best described as the centre in a cluster of meanings and only the total situation, which stretches far beyond the single sentence in many or most cases, will tell us the meaning the author had in mind when he wrote it" (Kvan, 1969, P.341). If this is the case, then the process of reading Chinese is radically different from that of reading English.

Third, and most important of all, the process of learning the characters normally begins in the kindergarten at the age of three years. The literacy rate has risen considerably in Hong Kong in the past two decades, and the educational process, being so highly competitive, is begun as early as possible in the child's life. Kindergarten schools are, therefore, widespread.

Thus, by the time Chinese children take the "entrance examination" for primary school, most of them can read, write, and take dictation in

about 100-160 characters. Some of these are very complex, requiring twenty or more individual strokes of the pen. Figure 5 shows a sample of the characters which must be formed by five-year-olds (cf. Kvan, 1969): the extreme left and extreme right columns are good and bad attempts to reproduce the centre model line.

Figure 5: Characters formed by 5-year-olds.
(From Kvan, 1969).



Kvan (1969) makes a comparison between this as a "developmental task" and a developmental task introduced by Charlotte Buehler in the West: Five-year-olds are asked to copy a figure, for example, a circle - and it is

deemed satisfactory if the ends of the drawing meet. Clearly the expectations of the two societies in terms of the child's perceptual capacities are considerably different.

I therefore hypothesised in the present research, that this process of learning to recognise and reproduce such complex visual stimuli as Chinese ideograms fosters the development of perceptual skills which may be reflected in performance on perceptual tests. In particular, I thought that the process of dealing with written Chinese might yield practice effects in "overcoming embeddedness" and in the process of coping with stimuli which are interconnected with other stimuli in complex ways, i.e. in "field-independence". The People's Republic of China being inaccessible, Hong Kong was chosen as the best spot for the purpose of testing this idea. The following section briefly outlines the reasons for predicting that these visual experiences might influence scores on "field-dependence".

(ii) The transfer of skills

In this section I hope to illustrate, by the use of specific examples, that the hypothesis of transfer effects between reading Chinese and distinguishing embedded figures is not an unreasonable one.

The fact that simple exposure to visual patterns provides an advantage in discriminating these patterns during later testing can be demonstrated even in the laboratory rat. Gibson and Walk (1956), for example, in line with a large number of other studies, found that two groups of experimental animals, one reared in cages with simple visual forms present on the walls, the other in cages without such forms, differed significantly in the speed with which they learned a discrimination

problem during adulthood. The results clearly demonstrated the effects of transfer of learning from the visual experience with the forms to the discrimination of the test stimuli, "...without the complications introduced by the specific application of reinforcement" (Gibson and Walk, 1956, P.242).

Results with children have indicated that similarly, a process of transfer seems to take place between a child's experience of the world, and the stimuli present there, and his ability to discriminate visual forms of a more abstract nature. Gibson, Gibson, Pick, and Osser (1962) suggest that, in development, children learn to distinguish outstanding features of objects, and that in performing discrimination experiments (of which "overcoming embeddedness" may be one form) they do not start 'cold' because of their already good ability to discriminate amongst other items in the environment. The work of House and Zeaman (1960) supports this idea even amongst retardate children, whose ability to discriminate between objects clearly transferred to the process of discriminating patterns.

Finally with humans in a cross-cultural context, Serpell (1969b) has furnished evidence to suggest that the processes of education involve the "...promotion of a certain kind of perceptual experience" (Serpell, 1969b, P.193). Education, he found, tended to be associated with more 'form-dominant' responses, amongst Zambian Ss, in form-colour preference tasks; and it seems likely that learning to read, and the activities of visual sorting involved therein, has a marked effect on a child's development of the ability to discriminate forms also.

Unfortunately, no direct evidence exists on the relationship between "rich" form-experience and the later capacity to 'overcome embeddedness'. In the light of the work discussed above, however, it does not seem

unreasonable to suggest that amongst normal, intelligent children, the experience of several years' exposure to 'discrimination' tasks involving forms which possess features akin to 'embeddedness', with all the accompanying 'task' and 'social' reinforcements, might well enhance their performance on a test of 'field-dependence'.

Thus I would predict that: the administration of an embedded figures test to a sample of Chinese Ss will reveal enhanced performance in a number of ways. First, I would expect that they would be relatively more 'field-independent' on the EFT than their counterparts in cultures which do not have access to the Chinese language. Second, I would predict that this effect would override the effects of "indicators inhibiting differentiation" in child-rearing, contrary to the expectations of Witkin et al. (1962). And third, if the process of learning Chinese had these effects on EFT performance, and Ss were not, due to the orientation of their culture, open to equivalent kinds of experiences in the proprioceptive dimension, I would further expect that the high correlations between the EFT and the RFT normally found in Western culture would break down.

Bearing these predictions in mind, I hope that my reasons for choosing a Chinese sample are now clearer. In providing the child-rearing conditions outlined in section 2(a) as making for 'field-dependence', and also the visual-experience conditions outlined in section 2(b) as making for 'field-independence', it seemed to me uniquely suited to the purposes of this thesis. A third important factor in this cross-cultural investigation will now be underlined.

(c) The effects of intelligence

This aspect of the investigation does not specifically require the testing of a Hong Kong sample, though they do offer some important advantages in this respect. Of course the standard disadvantages of cross-cultural testing still exist: problems of language, validation, standardisation, the appropriateness of items and so on.

The advantages of testing in Hong Kong mainly derive from the fact that the educational system there is fairly well established. This means that Ss are familiar with the typical testing requirements of focused attention, responding to questions, and trying to do as well as possible. In addition, a certain amount of psychological testing has already been carried out in Hong Kong, particularly with Raven's Matrices (and see Dawson, 1970), and this helps to provide a focal point for the discussion of test results.

It was emphasised in Chapter 1 that the role of intelligence in influencing 'field-dependence' scores is not at present understood. The second part of this investigation focuses on the relationships between intelligence and 'field-dependence' in a Chinese university sample. It is held particularly that the part played by intelligence in performance on the EFT increases with age. For example, Busch and deRidder (1971) have demonstrated that it may not be necessary to control for effects of intelligence in studies of 'field-dependence' with young (four-to six-year-old) Ss. However, bearing in mind the results of Goodenough and Karp (1961) and of Vernon (1969) (see Chapter 1, section 4(d)), it seems that at later ages the influence of 'g' and 'k' factors are keenly felt in the determination of 'field-dependence' scores. These results bring forth an important issue for cross-cultural studies. In the main, the

American studies which support the contentions of Witkin et al. (1962) were conducted with Ss younger than 12 years of age. The principal cross-cultural investigations, on the other hand, those of Berry (1966), Dawson (1967a,b), Wober (1967), and Okonji (1969), have more frequently used older Ss, of 15 years and above, and often adults. The hypothesis that intelligence becomes gradually more important as age progresses, for performance on these tests, might well explain many of the inconsistencies that have been found.

I believe, therefore, that general intelligence is one of the main features of the "taxonomy" of "field-dependence" which most requires investigation. In the first part of this thesis, its effects are as far as possible controlled, in order to examine the counteraction of the "child-rearing" and "visual experience" factors outlined above. In the second part of the thesis, while the effects of 'g' were again to be controlled, two samples believed to differ in the "structure" of their intelligence quotients (in the relative strengths of the 'v:ed' and 'k:m' factors) were compared in scores on 'field-dependence' tests. This, however, revealed difficulties which are discussed in Chapter 4.

The following section outlines in rough form the 'skeleton' or design of the study, and presents a list of the variables to be dealt with and the general relationships expected to hold between them.

3. Design of the study

(a) 9-year-old sample

(1) Independent, matched, and controlled variables.

The INDEPENDENT variables were the following:

- (1) "Culture" - perhaps not a fully autonomous variable since only Chinese culture was sampled.
- (2) "Socialisation" - described in section 2(a) of this chapter; its strength was assessed by a questionnaire method.
- (3) Visual experience - in this case exposure to the Chinese language (see section 2(b)) - reflected in ability on a Chinese language test.
- (4) Sex.

The male and female Ss were as far as possible MATCHED on:

- (1) Age.
- (2) Intelligence; Raven's Progressive Matrices, and a Chinese form of the Wechsler Intelligence Scale for Children.
- (3) Number of years in school.
- (4) Social class.

The CONTROLLED variables were the factors of visual acuity and colour vision.

(ii) Dependent variables.

The DEPENDENT variables were scores on the following tests:

- (1) The Witkin (1950) Embedded Figures Test (EFT) - 14 figures.
- (2) The Oltman (1968) Rod-and-frame Test (RFT) - 8 trials.
- (3) The Children's Embedded Figures Test (CEFT) (Karp and Konstadt, 1963).
- (4) The Kohs Block Design Test from the Wechsler Adult Intelligence Scale.

(iii) General Hypothetical Position

The principal guiding hypotheses with the 9-year-old sample were

the following: (1) that the sample would, despite child-rearing practices which have "indicators inhibiting differentiation", perform in a relatively more 'field-independent' manner on the EFT, RFT, and Kohs Blocks; (2) that the high EFT-RFT correlations found in Western samples would not be found in this sample; (3) that EFT scores would be related to Chinese Test scores; and (4) that intelligence and visual experience generally would have greater influence on the EFT than the socialisation factor implicated in other studies.

(b) University sample

(i) Independent, matched and controlled variables

The INDEPENDENT variables were the following:

- (1) "Culture", and
- (2) "Socialisation", as in 3(a) above.
- (3) Education: Ss were a highly selected sample, in two groups:
 - (a) Mathematics and Physics students, and (b) Chinese Literature students.

The two groups were also MATCHED on age and sex, and the sample was CONTROLLED against colour blindness. I had hoped to match the groups in I.Q. in addition, using the Wechsler Adult Intelligence Scale, but it proved impossible to do so.

(ii) Dependent variables

The DEPENDENT variables in this sample were scores on the following:

- (1) The Witkin EFT.
- (2) The Oltman Portable RFT.

(iii) General Hypothetical Position

The principal guiding hypotheses with the university Ss were these:

(1) Again, that the high correlations found in other groups between the EFT and the RFT would not be found here; (2) that the EFT scores of the Chinese Literature sample would show a closer correspondence to those of the Maths/Physics sample than that exhibited between the RFT scores of the two groups; and (3) generally, intelligence and education would be more closely linked to 'field-dependence' scores than would socialisation variables.

This is a rough outline of the study. The specific hypotheses tested, together with a detailed description of methods and results, are dealt with in the next two chapters, Chapter 3 for the 9-year-old sample, and Chapter 4 for the University sample.

CHAPTER 3: INVESTIGATION I

CHAPTER 3.1. Description of the sample

The reasons for the choice of Hong Kong Chinese as subjects in this thesis have been outlined in the preceding chapter. In the present chapter, the subjects of the 9-year-old sample, the tests given them, and the results obtained will all be described. As a preliminary to this, some features of society and education in Hong Kong will be outlined, in order to illuminate the background against which the research was carried out.

(a) Hong Kong: Society and Education

Hong Kong is a city of very marked social and economic inequalities and it is unfortunate that detailed information on the extent of these, for example on the proportions of the population in the various income groups, is not available. For general purposes, however, it is possible to draw on information presented by Agassi (1969) who gives a rough outline of the social and educational structure of the community.

The interpretation of this evidence is open to hazard, however, as the population structure of Hong Kong is at present undergoing very rapid quantitative and qualitative changes. Of paramount importance is the fact that Hong Kong citizens consist mainly of refugees from mainland China who came to the colony in the fifties and early sixties, with the result that the bulk of the population today consists of the families of these refugees. Thus in 1970-71 it was estimated that more than 50% of the population was under 20 years of age; and as these young people take up employment, the economic and social structure of the community will be subject to unpredictable change.

Two facts of great importance for psychological research emerge from this rough picture. Firstly, since there has been no empirical work done on the psychological effects of this process of rapid (and accelerating) change, firm statements concerning attitudes, child-rearing practices, the degree to which Hong Kong Chinese have become Westernised, etc., are impossible. The impact of this complex situation on the young - caught between Chinese and Western worlds, - between the traditional and the modern - is particularly difficult to assess.

Secondly, the pressure exerted by the process of social change on the educational system of Hong Kong, and on the children who pass through it, is enormous. The greatest factor in social mobility is the literacy rate, which has been rising steadily over the past few decades. In 1931 only 51% of the population over the age of ten could read (74% of the males and 19% of the females); whereas by 1964, 75% of the population were literate (91% of the males, and 58% of the females) (Agassi, 1969). This proportion will continue to rise now that primary education is compulsory.

One result is that motivation to succeed in education is extremely high. The process of being educated in Hong Kong is an extremely competitive one - there is a many-staged "pecking order" amongst the colony's schools, and the child is under pressure to excel and to move on to a relatively better school. This competitive pressure is at its most intense at the point of entry into Hong Kong University.

The problems of sampling in such a community are considerable. If the detailed structure of the community cannot be described, then it is hardly possible to design a sample that is truly representative thereof. I decided, in the present study, firstly to sample children from the same educational environment, as it would be almost impossible to obtain a

sample in Hong Kong schools which could be properly controlled for social class, family background etc. The criteria by which such a factor as social class are judged by the researcher are not necessarily those which would be shared by his subjects. In Hong Kong, writes Agassi (1969) "...occupations are pretty well ranked according to the income they bring" (P.73). But with a population as socially mobile as that of Hong Kong, it is unlikely that income differences would be correlated with those aspects of social class which are generally held to have psychological significance, - child-rearing practices, the inculcation of "internal" versus "external" controls, language codes, and so on.

I thought that the simplest way to obtain a sample would be as far as possible to test Ss from one school, or from two schools in close association with each other, thus controlling, as it were, the factor of educational environment. The characteristics of those subjects tested in the first sample are described in the following section.

(b) Characteristics of Subjects

The subjects of the tested sample were 54 9-year-old schoolchildren, tested in St. Anthony's and St. Louis' Primary Schools in the Sai Ying Poon district of Hong Kong (Victoria). These schools were side by side and were both run by members of a catholic religious order long established in Hong Kong. There were 33 boys and 21 girls.¹ Some background data are presented in Table 3.

¹ The larger number of boys is not disturbing as, in Witkin's work, the majority of his Ss are male. In practical terms, the discrepancy reflects the fact that there are more boys than girls in Hong Kong schools. Agassi (1969) notes that, while middle-class parents send equal numbers of boys and girls to school, the lower classes send a greater proportion of boys. This derives from the Chinese tradition that, if a choice for privilege must be made, it inevitably falls on the male.

TABLE 3: CHARACTERISTICS OF SS IN EVENTUAL SCHOOL SAMPLE

	<u>Boys, N = 32²</u>	<u>Girls, N = 21</u>
Mean age, Years and Months	9:4.8	9:4.76
Mean Number of Years of Schooling	5.65	5.69
Mean Number of Siblings	3.48	3.57
Father's Occupation Group ³		
Unskilled Manual	5	2
Semiskilled Manual	5	4
Skilled Manual	7	8
Lower Clerical	4	2
Lower Professional	6	5
Upper Professional	5	-

From the table it can be seen that the male and female groups were almost perfectly matched in age, number of years in school, and the size of the family from which they came. Only those Ss who had spent all their years of schooling in the same school, i.e. the one in which they were tested, were included in the sample. That the figure for years of schooling approaches 6 may seem curious to a Western observer: it is due

² One S was unable to describe his father's occupation.

³ The six categories were used roughly as follows: "Unskilled manual" included labourers and watchmen; "semiskilled manual", waiters, cashiers, etc.; "skilled manual", taxi-drivers, skilled factory workers, craftsmen; "lower clerical", clerks and shopkeepers; "lower professional", teachers and accountants; and "upper professional", doctors and managers of firms or factories. Clearly a broad spectrum of occupational groups has been sampled, and with the exception of the "upper professional" category, in roughly equal proportions for both boys and girls.

to the fact that in Hong Kong, schooling begins in kindergarten at the age of 3, as described in chapter 2.

(The subjects almost exclusively came from the third form of their respective schools. In obtaining them, the following method was adopted. The headmasters of schools were contacted first by letter, and later an appointment was made by telephone. A rough outline of the nature of the research was given them, and permission to test the children was sought. In both cases the headmasters proved very friendly and co-operative. They supplied class lists from which the names and dates of birth of children were obtained. In one school, St. Anthony's, almost all of the third form was tested, the exceptions being (a) a small number of children used to familiarise the testers with the procedures; (b) a considerably larger number whose visual acuity was very weak, or who proved to be colour-blind; (c) a very few children who reacted adversely to the testing situation and were wholly unresponsive. In the second school, an additional number of boys were selected randomly from the class register.)

In both the schools in which testing was carried out, as in the majority of Hong Kong primary schools, the medium of instruction was Cantonese; and all the Ss whose test scores were included in the sample (in fact, all the children in the school) spoke Cantonese only. While this was essential for the purpose of the research, it meant the use of an interpreter.

2. The test battery: administration

(a) The tests used

The tests administered to the Ss just described were the following:

- (1) The Landolt Rings, a test of visual acuity;
- (2) The Ishihara test, for detecting colour blindness;
- (3) A Chinese version of the Wechsler Intelligence Scale for Children; (Verbal scale only).
- (4) Raven's Progressive Matrices (1956);
- (5) The Embedded Figures Test (Witkin, 1950);
- (6) The Children's Embedded Figures Test;
- (7) The Portable Rod-and-Frame Test;
- (8) The Kohs Block Designs Test from the Wechsler Adult Intelligence Scale;

In addition, scores were obtained from the Educational Authorities on a Chinese language test; and a questionnaire was sent to the parents of each child, for information concerning child-training.

(b) The interpreter and test sessions

The tests were administered by a Cantonese interpreter in association with E. The interpreter, fluent in both English and Cantonese, was first of all trained in the methods of test administration. This involved several sessions in which the interpreter administered the tests to trial subjects under close supervision by E. It was emphasised that the procedures followed had to be as far as possible the same for all Ss; where necessary, test instructions were translated into Cantonese and retained in written form by the interpreter. The scoring of the verbal test (WISC) was done by the interpreter, but for all non-verbal tests it was carried out by E.

In all test sessions, the interpreter ((who was in fact female)) sat beside E facing S across a small table in the library of the school. When S arrived, he (or she) was seated, and first of all asked a few

simple questions, such as "do you like school?" in order to put him (or her) at ease. Inquiries were then made about father's occupation, number of brothers and sisters, position in family, and number of years in school. The test sessions were designed as far as possible to be stimulating, with the tests juxtaposed in an order which introduced variety in the tasks to be performed. The order of administration thought to be best, on a priori grounds, and followed for all Ss in the eventual sample, was as follows: Landolt Rings Test; Ishihara Test; Raven's Matrices; Kohs Blocks; Children's Embedded Figures Test; Embedded Figures Test; The Rod-and-Frame Test, conducted in another part of the room; and the Wechsler (Verbal) Intelligence Scale for Children. At the end of the session, children were given sweets. The whole testing period usually lasted about two hours, but it did not seem to fatigue any S; where possible, two Ss were tested in a day, one each in the morning and afternoon.

(c) Rationale and detailed procedures used in administering each test, in order of presentation

The Landolt Rings Test

The chief reason for the use of this test was simply to make certain that all Ss tested were capable of accurate vision up to a certain pre-arranged level. Ss who did not succeed in performing at the required level were not given any other tests. Many residents of Hong Kong suffer from poor visual acuity, yet a large proportion of these wear no spectacles owing to the expense involved. Thus it was necessary to ensure that Ss' eyesight reached a level which would not affect their performance on the other tests of the battery; performance on the Embedded

Figures Test, for example, might well be hindered by poor eyesight, and we must have a method of ensuring that low scores are not due to extraneous variables irrelevant to the test itself.

The material consists of a Wall Chart placed at S's eye-level. S is positioned 6 metres from this chart. On it is a series of twelve rows of five rings each; all the rings in each row are of equal diameter, but in each row this diameter is less than that of the rings in the row above; at a certain point in the circumference of each ring there is a gap. Using three demonstration rings, the procedure was explained by the interpreter. When E pointed to each ring, S was to indicate, by raising his arm in a manner akin to semaphore, at which point or in which direction the gap in the ring lay. The task was easily understood by all Ss, who seemed to enjoy it. They were required to complete the test up to the sixth row; those who failed to do so were eliminated from further testing. (A total of five Ss had to be eliminated on this basis.)

Ishihara: Colour Vision Test

This test was included for roughly similar reasons as the Landolt Rings Test: to control the sample and ensure that no Ss who failed or scored poorly on other tests, particularly the EFT, did so because of the extraneous factor of colour blindness. It is possible that for the colour-blind person, performance on the coloured cards of the EFT might be enhanced or made more difficult by their sensory deficit.

The materials consist of a series, in booklet form, of pseudo-isochromatic plates containing colours so chosen as to appear alike in certain kinds of colour-blindness, while appearing manifestly different to the colour-normal S. Administration is fairly straightforward. S is

merely shown each card in turn and asked to describe the pattern which he can see therein. In most cards, this is a number, while in others, it is a curved line pattern. With colour-normal Ss, the test is over in a very short time, usually under two minutes. Only one S in the whole third form failed the test. The test was administered in its entirety, since the difference between doing this and only administering part of it is almost negligible.

Only Ss who successfully completed this test and the Landolt rings were given the other tests of the battery. Two other Ss had to be eliminated later, when they failed to understand the task of finding embedded figures. Apart from these, all other Ss took all the tests and were included in the final sample.

Raven's Progressive Matrices

The purpose in using Raven's Progressive Matrices in this study was to attempt to match and control the male and female samples for intelligence. The particular value of Raven's Matrices in this respect lies in the fact that it is, factorially, relatively pure; it is non-verbal; it taps abstract intellectual abilities; but at the same time remains almost free of the 'k' (spatial) factor present in the other tests of the battery. Thus it can also provide an index of the extent to which 'g', and not 'k', influences 'field-dependence' test scores.

MacFarlane-Smith (1964) notes that the Matrices test is "...generally regarded as a good *g*-test" (P.205) and quotes factor-loadings of 'g' as high as 0.87 for the B and D series of the test, with loadings of the 'k' factor virtually negligible. Vernon (1969), while expressing doubts about the value of Matrices in cross-cultural research, lists the tests as one of the most highly loaded 'g' tests, with a small spatial loading.

There is, however, a slight 'k'-loading on series A, C, and E of the test (0.17; MacFarlane-Smith (1964)). This MacFarlane-Smith accounts for in terms of the need for "...attention to the figure as a whole" on items of these series. Furthermore, it has been observed that while amongst males, the spatial loading is negligible, amongst females it is consistently higher. The 'g'-loading for both sexes is, however, sufficiently high to warrant regarding the test as a satisfactory one for purposes of matching and control of groups in this investigation.

The form of the test used here was the 1956 one, with five series (A-E) of twelve items each. It involves the noting of explicit logical relationships between the different parts of a figure. It is presented in booklet form, each page containing one item. Each is divided into two parts: the upper half contains the problem matrix, the lower half the alternative possible solutions. The matrix consists of a 3 x 3 pattern of geometrical designs, from which one design, that in the bottom right-hand corner, has been removed. S's task is to choose from the alternatives in the lower half the design which he thinks correctly satisfies the logical relationships within the matrix. In each case there is only one correct solution (with the exception of the last item in the test). S may exercise a certain degree of trial and error, since the last response he makes, and expresses satisfaction with, is taken as his scored response. He may not, however, return to a problem after having gone on to the next.

The test is administered untimed, the maximum score being 60. Scoring is accomplished by reference to norms for S's age-group. In normal testing, the final score is represented, sensibly, in a grade form;

but since correlational techniques are to be used here, the most important datum was the number of items correctly completed.

An additional point which adds to the value of Raven's Matrices in Hong Kong is that local data exist for performance on the test. These data raise a number of points. The matrices test has been one of the most frequently and widely used ability tests in the colony; and Goodnow (1962) claimed that "...matrices scores appear to be a more-than-fair index of general intelligence" (1962, P.8). This is supported by the finding of a correlation of 0.77 between Matrices and Wechsler-Bellevue score amongst Chinese adults (P.15). Further, Godman (1964), having administered the Matrices to a sample of 1007 Primary School pupils in the colony, obtained a correlation of 0.44 with school attainment. Thus the Matrices would seem to be supported as a test of general intelligence in Hong Kong. However, Fung (1966), in a study of the relationships between Matrices performance and performance in four academic areas, found that while there was a correlation of 0.31 ($p < .01$) between matrices scores and performance in physics and mathematics, the corresponding correlation between matrices and performance in arts subjects (English and Chinese) was 0.10. This supports MacFarlane-Smith's (1964) view of the role played by a minor "spatial" component in the test; Fung (1966) urged that a verbal test be developed and used with the Matrices test in Hong Kong. Hence the use of a Chinese version of the Wechsler Intelligence Scale for Children reported later in this chapter. Generally, though, the Matrices seems adequate as a general ability test; its correlation with a verbal test in Hong Kong was found by Li (1964) to be 0.46 ($p < .01$) and that writer concluded that it "...samples an important aspect of the ability to do well at school." (P.190). Correlations between the Matrices

and the WISC (verbal) are described in section 5(b) below.

One final cautionary note arises, however, from this same study by Li (1964). With samples of Ss of above average ability, in this case University Diploma of Education Students, and two groups of students from post-secondary colleges, the test was found not to discriminate properly at the higher levels of scoring: towards the top end of the distribution, the curves for all three groups merged. It was not envisaged at the outset of the present study that the problems of a low test ceiling would be met with.

Kohs Block Designs Test (WAIS)

This test has been widely used in cross-cultural research (McConnell, 1954; Jahoda, 1956; Berry, 1966; Dawson, 1967a,b; Vernon, 1969; Wober, 1970) and incorporates features of both intelligence and 'field-dependence' tests. Its loading of 'g' may be as high as 0.68 (Vernon, 1969); nevertheless it is most frequently regarded as a test of spatial ability (MacFarlane-Smith, 1964). It is included here essentially for purposes of comparison with the work of Dawson (1967a ,b) and Berry (1966), and also to help delineate further the specific relation of 'field-dependence' tests to the 'g' and 'k' factors in a Chinese sample.

The test used here is that taken from the Wechsler Adult Intelligence Scale. Preliminary testing with some Ss not included in the final sample revealed that the WISC block designs was too simple, and would not yield a fair score distribution, and that the full-scale Block Designs Test itself was too difficult. The WAIS test was therefore used as a compromise measure.

Test materials consist of nine blocks identical in size (cubes of side 1") and colour (two sides red, two white, and two diagonally cut into

red and white halves); ten cards, on each printed a design in two dimensions, which S has to reproduce; and a stopwatch.

The procedure for administering the test was as given in WAIS manual (Wechsler, 1955). One minor modification was, however, introduced. Before presenting card 7, the additional five blocks were given to S and it was pointed out that for the following trials he (or she) would need to use a 3 x 3 design; this extra instruction was given to slightly facilitate performance since the Ss were so young. As always, the time taken by S to make a complete reproduction of the design on the card provided the raw data from which his score was calculated by reference to the manual. The maximum possible score is 48.

The Children's Embedded Figures Test

This Test (Karp and Konstadt, 1963) was originally designed to provide an embedded figures test which could be used with Ss below the age of 9 to 10 years. I, too, initially considered that the adult EFT would be too difficult for children below this age limit, but found instead that the reverse was the case. The CEFT was too easy for most Ss: out of a maximum possible score of 25, 80% of the present sample obtained a score of 19 or more, and approximately 70% of the scores fell in the range 19-23. Thus the test did not prove to be a very useful discriminator of 'field-dependence'. Hence in the present study it served as more of an introduction to the EFT than as a valid measure in its own right.

The CEFT is similar in principle to the adult form of the test described below, but the presentation and level of difficulty are considerably modified. The materials consist of two series of cards, the T series and the H series, of simpler drawings than in the EFT, designed to

look like houses, toys, etc. to retain the interest of children. Thus there are only two simple shapes, T (a red triangle) and H (a blue polygon shaped like a house). The "complex" cards are 8" x 5", numbered in series, and arranged roughly in increasing order of difficulty. Additional practice cards are also provided. For the T series, which is simpler, the demonstration card consists of a series of three drawings which illustrate the principle of embeddedness: a simple item is shown first, then its presence as part of a larger item, then the conjunction of this as part of a whole drawing. This is accompanied by verbal instruction from E, particularly indicating that in each drawing the "hidden" shape will always be in the same orientation; an especially thick black line indicates which side is the base of the isosceles triangle.

There is no time limit on this test; S's score is simply the number of figures he successfully finds at the first attempt. The test took only several minutes to complete and Ss seemed to enjoy it thoroughly; it also probably had the effect of increasing motivation on, and facilitating the understanding of, the EFT.

The Embedded Figures Test

The material for the Embedded Figures Test consists of 14 of the figures devised by Witkin (1950), based on the principles of Gottschaldt (1926). Each trial involved the presentation, at different times, of simple figures, which had to be found, and complex figures, in which the simple ones were hidden or embedded.

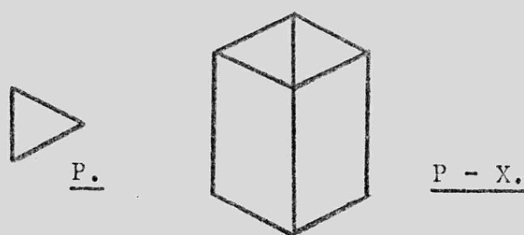
The figures were presented on cards approximately 5" x 3" in size, covered with thin cellophane for protection. The following were the figures used (referring to the standard numbering): the practice figures P and P-X; and test figures 1-A, 2-B, 3-C, 4-D, 5-E, 6-A, 7-F, 8-E, 9-C,

10-G, 11-A, 12-H, 15-D, and 20-C. The simple figures, labelled A to H, are simple geometrical line drawings, left uncoloured; the complex figures, with the exception of 6-A, are all coloured in order to increase the difficulty of the task. Task difficulty was also ensured by not having too many complex figures corresponding to one simple figure, and by separating complex figures which contained the same simple figure (to avoid any kind of "massed" practice effect.)

The principle on which this test is based is a very straightforward one: in common with the older Bender-Gestalt tests, the S's task is simply to find the simple figure in the complex figure with the maximum possible speed.

The test procedure was as follows: S was seated at the table with the stimulus items before him; E was equipped with a stopwatch. The nature of the task was first explained to S, using practice items P (simple) and P-1 (complex). These are presented in Figure 6 in order to illustrate the principle of the test.

Figure 6: EFT - Practice Items.



The following instructions were given to S (these have been translated into Cantonese and back into English by different interpreters):

"What we are going to do is show you some shapes like this (presenting P-X) and ask you to look at them for a little while; then we will give you a card with a different shape on it, like this (presenting P); you must look at it and try to remember what it is like. When we take

this card (P) away, we want you to look at the first card and try to find the shape of the other one inside it; if you find it, tell us, and show us where it is by drawing round its edge with this brush (presenting brush). Each time we want you to do this as fast as you can."

These were the basic instructions; in practice some additions had to be made, depending on the situation. For example, many Ss regarded the mirror-image shape of P in P-1 as a solution, and it had to be demonstrated that the simple shape, when found, would always lie in the same orientation as when originally presented. Other Ss were hesitant in drawing round the shape's boundaries. (There cannot be many tests on which the myth of standardised presentation must be modified so rapidly!)

All Ss whose scores were eventually included in the data analysis showed an apparently clear understanding of the demands of the test. Only two testees gave performances which showed lack of understanding; their scores were not taken, and the test had to be discontinued.

Test trials proceeded as follows: S was first shown the appropriate complex figure, and allowed to examine it for 15 seconds; next, the corresponding simple figure was placed on top of the complex one, obscuring it, and S was allowed to view it for 10 seconds; it was then removed, exposing the complex 'test' figure, and simultaneously the stop-watch was started. The score was simply the time taken to locate and outline the simple figure; if S's given outline was incorrect, the stop-watch was kept running: the time limit was 3 minutes. If S failed an item, the correct solution was then shown him. In addition, S was allowed to see the 'test' simple figure again if he insisted, but only for 10 seconds at a time; this was not included in his solution time. If the procedure of letting S look again at the simple figure is NOT adopted, then the test taxes memory factors too much and loses validity.

The most important modification introduced into the test administration was an alteration in the order of presentation of the cards so that easier ones came at the beginning. This, I think, helped Ss to grasp the nature of the task, and increased their motivation by bringing earlier success.¹ Thus the actual order of presentation was: 11-A, 15-D, 10-G, 1-A, 20-C, 5-E, 7-F, 4-D, 6-A, 8-E, 3-C, 2-B, 9-C, and 12-H. In no case were complex figures containing the same simple figures given consecutively.

To obtain S's score, his times in seconds on each trial were summed; These final scores are given in the Appendix, separately for boys and girls. The total time on the test was normally less than 20 minutes but in one case took almost 45 minutes.

The Rod-and-Frame test

The portable Rod-and-Frame apparatus used in this study is that designed by Oltman (1968) for use in the field. The apparatus rests on a 24" x 36" plywood base, the plane of which is adjustable by means of screen devices at each corner; a spirit level is provided. The "frame" is a rectangular box-like enclosure with walls of translucent plastic, with circular discs, 22" in diameter, mounted at either end. These discs rest on a pair of rollers which permit the smooth tilting of the enclosure to the right or left to an angle of 28°. At one end of the box enclosure is a headrest so positioned as to ensure that an S's visual

¹ In fact, in the EFT manual produced since this testing was done, Witkin, Oltman, Raskin, and Karp (1971) specifically allow that the order of presentation of the cards may be altered with younger Ss, and add that "...at these younger ages, the procedure may be presented more informally when deemed necessary to sustain the child's interest and motivation" (P.18).

field from the headrest is restricted to the interior of the box. An adjustable curtain is provided which permits occlusion of this field when necessary. At the opposite end of the box-like enclosure, pivoted so that it can be tilted independently, is a separate disc, 22" in diameter, painted white on the side facing the interior of the box. The rod is mounted on this, and consists of a strip of black plastic 11" x $\frac{3}{8}$ ". The frame is formed on the inside of the box, at the end opposite the headrest, by the positioning of black plastic strips which extend $\frac{3}{8}$ " beyond each edge.

Thus when S rests his head in position and views the interior of the box, his only stimuli are the black rod and black frame, which rotate on the same horizontal axis, and the surrounding whiteness of the box enclosure. This is so designed, from 12" x 24" x $\frac{1}{8}$ " white acrylic plastic sheets, as to diffuse light uniformly throughout the interior of the apparatus, so 'eliminating' depth gradient cues. With the exception of the inner surface of the disc bearing the rod, all other parts of the apparatus, including rod, frame, external frame corner-ribs, discs, and base, are painted in a matt black finish.

Finally, on the back of the disc bearing the rod is a photographically magnified protractor scale, with readings to 30° to the left and right of the true vertical position of the rod.

Before the administration of the test the apparatus was firstly examined, and its base was adjusted to the horizontal plane. S was then shown the apparatus, which was placed on a table, with the headrest at an edge to permit S to sit in a chair with his head comfortably in position. Firstly, the rotating action of "box" and rod were demonstrated: S was shown how both could be tilted in the same and in opposite directions. Next, the concept of the vertical was explained to S. This caused a

little difficulty among Chinese Ss, largely because of their "polite" willingness to affirm that they understood when they did not do so. Reference was made to the walls of the building, the corners of the room, and the position of the body when standing up straight. The school being a Roman Catholic one, an additional metaphor used was the idea of the direction of heaven, directly above, which helped some Ss. All Ss whose scores were eventually used showed an adequate understanding of the task involved. Only two Ss had to be eliminated owing to scores so erratic as to indicate failure to grasp the concept involved.

When S seemed to have grasped the notion of the vertical, it was explained that the rod and frame were to be tilted, and that the task would be to help E to adjust the rod back to "true" vertical. He would have to do this a number of times, and before each trial his gaze would be occluded by a small curtain. This was adjusted by the interpreter. When the curtain was removed, S would be asked whether he thought the rod was in a vertical position, and if not, whether it needed to be moved in a clockwise or anticlockwise direction to return to the vertical. When S had indicated the direction, E would move it in small steps, and after each, S would indicate whether the rod had been moved enough and was now vertical, or required further moving. This was done simply by use of the words for "enough" or "move".

When S adjusted the rod to nearly vertical, a finer adjustment procedure was brought into play and he was allowed to indicate whether the rod needed to be moved clockwise or anticlockwise. Thus, as accurate an assessment of S's judgment as possible was made.

S was seated at the apparatus and this procedure was followed for each trial. For the first trial, the frame was tilted 28° to S's left,

as was the rod. Adjustments of the rod was made in 3° steps except in the "finer adjustment" procedure, when much smaller movements were made. When S was satisfied that the rod was vertical, the error reading, that is the tilt of the rod from vertical, was noted from the back of the rod-disc. The curtain was drawn and the rod was tilted 28° to the right, the curtain removed, and the procedure repeated. Eight trials in all were conducted, using the following sequence of positions (L = left, R = right): for the frame: LLRRLRRR; for the rod, LRRLRLRL. S's error score was noted after each trial and the sum of errors over all eight trials became his score on the test. The whole test never took more than 15 minutes to administer, and was usually completed in less than twelve. Total error scores on the test showed a remarkably wide range from 10° to 187° .

Additional precautions consisted of asking S at the outset if he could see anything other than the frame of the box, and ensuring he could not; and of asking S to keep his head in the rest throughout the testing period.

The Wechsler Intelligence Scale for Children (Verbal)

Ideally, it would have been preferable if there had been in Hong Kong a local, well-used, thoroughly standardised verbal intelligence test, which could have been used in this research. Failing that, the next best alternative would have been a translation of one of the standard Western tests, which might still have had considerable validity, since most education in Hong Kong now proceeds on Western lines. However, the only instrument available was a translation of five subtests from the Verbal Scale of the Wechsler Intelligence Scale for Children. These were made available by Dr. David Ho of the University's Department of Psychology. Unfortunately, no norms or statistical data are available for these tests.

However, it is possible to argue that for the purposes of matching groups in research, data which relate performance of one's samples to that of the population as a whole are not absolutely necessary. Within the context of one piece of research, the tests have a kind of validity in (a) enabling one to reject Ss who fall outside a certain range of scores, and (b) making possible the rough matching of two groups in their scores on the test. And since education in Hong Kong emphasises achievement in similar areas to those emphasized in the West, it can be claimed that there is a fair chance that a Western test, with obvious modifications included, will succeed in tapping the same kinds of abilities which are assessed when testing a Western sample.

It was with these considerations in mind that the WISC was used in the present research. Five subtests were available, already translated into Chinese, with appropriate modifications: Information, Comprehension, Similarities, Digit Span, and Arithmetic. No Vocabulary Test was available, this being probably impossible to translate; perhaps Vocabulary tests, more than any other kind, are totally "culture-bound".

The list of modifications introduced in the Information, Comprehension and Similarities subtests are given in the Appendix.(2). No changes were made in the Digit Span or Arithmetic Subtests, these being dependent on the (almost) universal capacities of numeracy and short-term memory.

Apart from the various minor modifications, which concerned individual items only, the procedure in administering these tests was exactly that described in the WISC manual. The testing was introduced after S had returned to his seat at the table, subsequent to his having taken the Rod-and-Frame Test. The Interpreter simply said "Well now I'd like to ask you some simple questions" and proceeded with item 4 of the

Information Subtest, as indicated in the manual. Since all the responses to these tests were inevitably in Cantonese, the recording of responses was also carried out by the interpreter, who also did the scoring. Wherever the interpreter was doubtful concerning a response, it was written down and later scored by E. On the Arithmetic test, E operated the stopwatch and noted times taken while the interpreter noted the responses themselves.

These subtests are straightforward and fairly simple in their structure. Each consists of a series of items of graded difficulty, and the rough composition of each is as follows (in order of presentation):

- (1) General Information: 30 items, each a question on some item of general knowledge, such as "how many days are there in a week?" or "How tall is the average Chinese?" Each item is scored 1 (correct) or 0 (incorrect) and details of correct responses are given in the manual.
- (2) General Comprehension: 14 items concerned with S's degree of understanding of the world around him, illustrated by such questions as "Why are criminals locked up?" These items are scored 2, 1, or 0 according to the degree of appropriateness of the response, the relative amount of insight which it suggests, again by reference to the manual.
- (3) Arithmetic: 16 items, ranging from simple counting to more difficult items involving the retention of figures in the memory while performing various arithmetical operations. Again, these are scored 1 (correct) or 0 (incorrect), and time limits are imposed.
- (4) Digit Span: In this subtest, a series of digits is spoken to S, and he is asked to repeat them to the Interpreter; the number of digits increases from three to nine. S is then asked to repeat a similar series of digits backwards; the number increases from two to eight, giving a total of 14 items, each scored 1 or 0.

(5) Similarities: This test consists of 16 items. The first four, to acquaint the S with the general principle, are of the analogies type, e.g. "lemon is bitter but sugar is...."; items 5 to 16 are of the form "In what way are A and B alike?" The first four items are scored 1 or 0, the last twelve, 2, 1, or 0 according to the category of response.

In obtaining S's score on this test, his raw score is first converted to a scaled score, by consultation with tables in the manual; these are based on scores of other children in Ss age-group. No data being available for Hong Kong, the British norms were used. The scaled scores obtained for the five subtests are added together, and this final sum is the figure used in calculating the correlation coefficients which are the main results of the present study.

The Chinese Language Test

The WISC was the last test given to Ss in the testing sessions. However, other scores were obtained for 42 of the Ss with a view to testing hypotheses concerning the relationship between scores on the Embedded Figures Test and performance on Chinese language Tests, as outlined in Chapter 2. These hypotheses will be stated in section 3 below.

The scores on the Chinese language Test were not obtained directly by E, but were made available by the Research, Testing and Guidance Centre of the Department of Education, Government of Hong Kong. These tests had been devised by the Hong Kong Government with the aim of assisting teachers in assessing the progress made by their pupils in Chinese during the third and fourth forms of primary school. In Hong Kong, these tests are now administered annually to children between the ages of nine years four months and eleven years three months in any school which asks that the assessment be made. (Parallel Tests are also available in English and Arithmetic.)

For the purposes of the present study, it was essential that some estimate of S's ability in Chinese be made. It was reasoned that to some extent a language test would reflect an individual's capacity to deal with the complex system of perceptual inputs that is the Chinese written language. Accordingly, with the permission of the headmasters concerned and of Mr. S.H. Ng of the Research, Testing and Guidance Centre, the available scores on the Chinese Test for Ss of the present sample were consulted. The actual testing had taken place six months before; it was felt that such an interval would not adversely affect the validity of the scores for the present purposes.

The test from which these scores were derived is a group test, consisting of a total of 55 items, with a time limit of 25 minutes. It is divided into four parts: Part I: Sentence Completion items (1-30); Part II: Sentence Completion with Synonyms (items 31-47); Part III: Sentence Completion with Antonyms (items 48-51); Part IV: Comprehension (items 52-55). Thus the test focuses on vocabulary and language comprehensions, and on the ability to distinguish characters which are closely similar in meaning. All the items in the test used a forced-choice response technique.

The Kuder-Richardson reliability coefficient for this test, computed from test results in a representative sample of 800 Hong Kong school-children, is remarkably high: 0.926. Thus as an indicator of a child's ability to comprehend written Chinese, it is by any standards a very reliable instrument.

The obtained scores on this test for 42 children in the present sample (21 boys, 21 girls) were recorded, and the method of handling them in relation to the hypotheses to be tested is described in sections 4 and 5 below.

All test scores arranged in tabular form by subject, are presented in Appendix I.

Parents' Questionnaire

In order to carry out a test of Witkin's "socialisation" hypothesis (Witkin et al., 1962; Dyk and Witkin, 1965; Witkin, 1967) outlined in Chapter 1 (section 1(c)), it was necessary to obtain information concerning parents' attitudes to child-rearing, the methods they employed, and the extent to which these may be said to foster or inhibit the development of "psychological differentiation" which plays a central part in Witkin's theory of 'field-dependence'.

For this reason, a short questionnaire of 20 items was compiled, and sent to the parents of all the children in the sample.

In academic terms, it may seem illogical to criticise the use of questionnaire methods as in section 3(d) of Chapter 1, and then subsequently to fall back on those very methods whose validity has been called into question. However, it can be argued that successfully to discredit the Witkin "socialisation" hypothesis on its own level the use of similar methods is justified. Indeed to go beyond these methods even for the sake of using more valid ones might not be conducting a proper test of Witkin's hypotheses.

Initially, I had decided to ask each S to rate the strictness of his family home in a manner similar to Berry (1966), but then decided that this would not be searching enough. A three-point scale of strictness in the home would do artificial and crude violence to the reality. In two societies, with greatly differing languages, "permissiveness" and "strictness" might well mean very different conditions.

In addition, the questionnaire method was the only really manageable one from a practical point of view. It is simply not possible to enter Chinese homes and conduct an interview, as would have been preferable; there are considerable cultural barriers, not to mention the financial barriers of paying the interpreter. It seemed more likely that a questionnaire, being carried out in the name of the child's school, would receive the co-operation of the parents than would an interviewer and interpreter who visited the home.

The questionnaire itself was translated into Chinese by the interpreter and translated back into English by a member of the Psychology Department of Hong Kong University. The 20 items were based on the questions of the Home Interview Schedule of the Harvard Laboratory for Research in Instruction, which had been used by Seder (1957) in research on individual differences in "field-dependence". The items selected were those which seemed to probe most directly into the various factors in child-rearing which are held by Witkin et al (1962) to be responsible for individual variations in the extent of "differentiation". Of particular interest in this respect were (a) the relative frequency of punishment as a measure of parental strictness or harshness; (b) the degree to which the child was allowed manifestations of independence; (c) the relative amount of pressure on the child to succeed in work and tests; and (d) the extent to which the "differentiation" of the child's body-concept was allowed to develop in infancy. The complete questionnaire may be inspected in Appendix III.

In practice, the questionnaires were prepared in stencilled sheets, with a fair amount of space for parents' replies, and sent to the parents via the children. All came back promptly within one week as requested.

The above are the various methods by which data relevant to the hypotheses under test were gathered. In subsequent sections, the results obtained from the various tests and from the questionnaire will be reported.

3. Specific Hypotheses

Before examining these results, the various ideas emerging from Chapters 1 and 2 above should be expressed in testable form.

The specific hypotheses in Investigation 1 were:

- (1) that Ss would perform in a relatively more "field-independent" manner than their American counterparts on the RFT and the EFT. The reasons behind this hypothesis were the ideas that intelligence, education, motivation and exposure to the Chinese language would all combine to boost Ss scores on tests of perceptual "field-dependency"; (Cf. Pp. 23-28, 43-49, 64-72).
- (2) that the high EFT-RFT correlation found in Western studies would not be found with the present sample, because Ss would be relatively more experienced at overcoming embeddedness in the visual sense-channel alone, owing to their experience with the Chinese language; (Cf Pp. 64-70).
- (3) that EFT scores would be significantly correlated with scores on the Chinese language test, because both tasks involve some overcoming of embeddedness and skill at the former might be a function of experience with the latter; (Cf. Pp. 64-70).
- (4) that correlation between the EFT and Matrices would be substantially higher than those between the EFT and the RFT; because of the EFT's relationship to intelligence, and to skill with complex geometric

forms, while the RFT involves skill in a proprioceptive mode; (Cf. Pp. 43-47).

- (5) that there would be significant sex differences on the RFT scores, but not on EFT scores. The reasons behind this hypothesis lie in the idea that Ss would tend to be relatively more uniform on their EFT scores, since these would be related to Chinese language scores, etc.; whereas in the proprioceptive mode sex differences might appear owing to the males' greater experience and skill in the performance of tasks involving a developed sense of body-image. (Cf. Pp. 29-32, 64-70).
- (6) that analyses of the parents' questionnaire responses would prove to have no predictive value in terms of EFT and RFT scores; this hypothesis to some extent follows from hypotheses (1), (2), and (3), and is a general expression of reluctance to accept Witkin's "socialisation" hypothesis, where other factors are dominant in the determination of EFT and RFT scores. (Cf. Pp. 14-16, 21-23, 64-70).

4. General Results, and discussion of the fate of each hypothesis

The raw data from all the tests outlined are presented in Appendix

1a. Correlations between the tests were computed using the Spearman rank-order method; the significance of the difference between test means for the sexes were obtained by t-test.

The results will be presented and discussed under the headings of the various hypotheses stated in the preceding section. Thus, each hypothesis will be stated, the method of testing it made clear, and the results reported and analysed.

Means and standard deviations on the principal tests of the battery are presented in Table 4. T-tests of the differences between the means

of the male and female groups on the measures of intelligence were not significant; thus in addition to being matched in age, years and nature of schooling, linguistic and cultural background, these two groups are also matched in intelligence. The results relevant to this conclusion are presented in Table 5.

TABLE 4: MEANS AND STANDARD DEVIATIONS, SAMPLE 1.

	Boys $\bar{x}$	N=33 S.D.	Girls $\bar{x}$	N=21 S.D.		Boys $\bar{x}$	N=33 S.D.	Girls $\bar{x}$	N=21 S.D.
WISC (Scaled)	58.39	9.5	54.14	10.12	EFT:mean sec/item	73.6	28.06	81.2	32.7
Matrices	36.5	9.11	38.0	8.01	CEFT	20.27	2.29	21.33	2.71
RFT: Mean error (deg.)	6.9	5.6	9.3	6.7	Kohs Blocks	28.4	6.7	26.7	8.9

TABLE 5: THE MATCHING OF INTELLIGENCE SCORES

	Boys $\bar{x}$	N=33 S.D.	Girls $\bar{x}$	N=21 S.D.	t	p
WISC	58.39	9.5	54.14	10.12	0.25	<0.45
Matrices	36.5	9.11	38.0	8.01	-	N.S.

- (a) Specific Hypothesis 1: that the Ss will perform in a relatively more 'field-independent' manner than their American counterparts on the RFT and EFT.

In Table 6, 'field-dependence' scores for my sample are compared to

those of two Western samples, tested respectively by Witkin, Goodenough, and Karp (1967) and by Witkin et al. (1962); (quoted in Witkin et al., 1971). The comparison is between American 8- and 10-year-olds and the present 9-year-olds.

TABLE 6: COMPARISON WITH AMERICAN SCORES: SAMPLE 1.

	RFT ¹				EFT ²			
	M		F		M		F	
	$\bar{x}$	N	$\bar{x}$	N	$\bar{x}$	N	$\bar{x}$	N
U.S. 8-year ³	17.1	26	21.5	27				
U.S. 10-year ³	14.8	54	17.7	54	137.0	54	156.0	54
U.S. 10-year ⁴					117.9	51	126.9	52
H.K. 9-year	6.9	33	9.3	21	73.6	33	81.2	21

In one case here, in which standard deviation values are available, it is possible to make a statistical comparison of the results. This is between the Witkin (1962)⁴ group and the Chinese sample on the EFT. Table 7 gives solid support to what is obvious on inspection: that the 9-year-old Chinese group do seem to be substantially more 'field-independent' than their American counterparts.

¹ Mean degrees of error per trial made by the Ss in the sample.

² Mean number of seconds to solution per figure.

³ from Witkin, Goodenough and Karp (1967).

⁴ from Witkin et al. (1962). S.Ds. quoted in Witkin et al. (1971).

TABLE 7: STATISTICAL COMPARISON WITH U.S. 10-YEAR-OLDS: EFT

	$\bar{x}$	S.D.	t	P
Males: U.S. 10-year	117.9	32.9	6.38	<.005
H.K. 9-year	73.6	28.06		
Females: U.S. 10-year	126.9	30.1	5.73	<.005
H.K. 9-year	81.2	32.7		

It is not easy, in terms of Witkin's theory, to explain why these Ss, though coming from a cultural group which he would expect to be more 'field-dependent' (cf. Pp. 64-72), have performed so successfully on the two perceptual tests. A number of explanations can be rejected at once. Clearly, the slight modifications in procedure which may have facilitated performance on the EFT cannot be the cause of the differences between the two samples, for comparable modifications were not introduced with the RFT, yet the scores are equally discrepant. It also seems unlikely that visual experience could be the explanation: one would expect then that only EFT performance would be enhanced. Finally, it is probably unsound to suspect that these samples differed in intelligence (though it is possible): this would not explain the substantial gains made by Chinese in RFT performance; and Witkin's (1962) Ss were probably quite an intelligent group. So I would accept the differences between Witkin's Ss and mine as "real".

The most likely explanation of the findings of Tables 6 and 7 is in terms of motivation. Coming from an urban society in which such a strong accent is placed upon education, and in particular, there is such considerable pressure to perform well on tests, it is very possible that the

motivation to perform well on these tests was even higher for the Chinese Ss than for American Ss. Certainly an explanation in terms of a "differentiation" or "socialisation" hypothesis would prove inadequate for these findings. The data suggest the possibility that motivational and/or cognitive factors have overridden the possible effective aspects of socialisation, and point to the idea that performance on 'field-dependence' tests cannot be fully explained within the limitations of Witkin's conceptual framework.

(b) Specific Hypothesis 2: that the high EFT-RFT correlation found in Western studies of "field-dependence" would not be found in the present sample.

TABLE 8: TEST INTERCORRELATIONS - SAMPLE 1¹

	N	Kohs	EFT	RFT	MATRICES	CHINESE ²
WISC	m 33	.25	.39	.13	.47***	.44*
	f 21	.38	.33	.52**	.74***	.49*
MATRICES	m 33	.47***	.43**	.25		
	f 21	.46*	.52**	.59***		
RFT	m 33	.51***	.66***			
	f 21	.48*	.52***			
EFT	m 33	.66***				.35
	f 21	.76***				.15
CEFT	m 33		.37*			
	f 21		.74***			

¹ * $p < .025$ ** $p < .01$ *** $p < .001$.

² Correlations with Chinese language scores for males have N=21 only, for females N=19 only.

The relevant results are presented in table 8. Hypothesis 2 is disconfirmed by the results. The findings of other American and cross-cultural studies, of a high degree of relationship between the EFT and the RFT, have been reproduced in a Chinese sample. Indeed, the EFT-RFT correlation for males ($0.66, p < .001$), and the EFT-Kohs correlations for males and females (0.66 and $0.76, p < .001$ for both) are among the highest reported on these tests anywhere in the literature.

The above results offer substantial support for the notion of a unitary "field-dependence-independence" dimension. The suggestion of hypothesis 2 was that, under the influence of factors such as intelligence and visual experience with Chinese characters, both of which were thought to play a much larger role in EFT performance than in RFT performance, scores on the EFT would "break away" from scores on the RFT and correlate more specifically with Intelligence and Chinese language tests. This is clearly not the case.

Closer examination, however, suggests that the test inter-correlations do not provide absolutely clear-cut support for the Witkin theory either. Though the highest correlations are amongst the "field-dependence" battery, (EFT, RFT, and Kohs Blocks), the influence of a general intellectual factor still remains considerable. All three of these tests are significantly related to Matrices performance; and though this test has an acknowledged spatial factor, its loading of 'g' is much higher; and it is noteworthy that while, with adults, Kohs Blocks seems to involve a substantial spatial factor, "...among children it seems to be mainly a test of general intelligence or deduction, with only a small perceptual-spatial loading." (Vernon, 1969, P.143.)

In addition, the pattern of correlation coefficients examined in terms of sex differences does not conform wholly to the pattern predicted

by Witkin's theory. Correlations between the EFT and Kohs Blocks are substantially higher in the female than in the male sample. It might be possible to argue that in a culture in which (ostensibly) the male parent dominates the home, more consistent "field-independent" performances would be produced by their daughters than by their sons. (cf. Corah, 1965). I think it more plausible, however, that the explanation lies elsewhere, in intelligence: because correlations between the EFT and the Matrices are also higher for girls, and their mean score on the Matrices (Table 4) was marginally higher than that of the boys. In view of the differential sex results, Witkin's theory does not cover the case, and a more likely explanation would seem to lie in some common 'intellectual' factor rather than a specific 'personality' one.

(c) Specific Hypothesis 3: that EFT scores would be significantly correlated with scores on the Chinese language test

The third hypothesis received no clear support from the results of Table 8. Performance on the EFT is most closely related to that on the RFT and Kohs Blocks, as discussed in the preceding section; the correlations between EFT and the Chinese Language Test of 0.35 (N=21) for males and 0.15 (N=19) for females offer little evidence of any strong relationship between performance on the two tests: Chinese language scores are, predictably, significantly correlated with WISC performance for both sexes.

This brings one to the main failing of the present study, namely that the idea that there would be a relationship between "overcoming embeddedness" in EFT items and "overcoming embeddedness" in reading Chinese was

not adequately tested. It was originally thought that the Chinese language test would to some extent be an indication of an S's capacity for reading Chinese; in fact, the test is really one of linguistic conceptual skills; though it probably involves a small component of "overcoming embeddedness", it is really a test of intellectual rather than perceptual functioning. Hence its significant correlations with the WISC (verbal) scale: no other task in the battery taps these aspects of cognition. To the extent that it has a positive, and nearly significant correlation with the EFT amongst males, it may be part of a network of connections with intellectual abilities at their centre.

Consequently, while the idea that reading Chinese might enhance EFT performance cannot be dismissed, the hypothesis has not fared very well. An alternative idea would have been simply to construct a Chinese reading test; this would have been a more precise indicator of individual differences on the "perceptual processing" aspect of linguistic skills. However, conversations with Chinese in Hong Kong about the processes involved in reading their language suggest that the degree to which it involves any "dis-embedding" is minimal; most characters are learned by rote memory; items are usually perceived as wholes rather than analysed into parts; and the automatic skill which the vast majority of reading requires bears no similarity to processes of "sorting" or "visual search". A more likely channel through which language can influence space perception is in the relative codability of different space-localising terms, as suggested by Berry (1966) in his work with the Eskimo.

- (d) Specific Hypothesis 4: that correlations between the EFT and Matrices would be significantly higher than those between the EFT and the RFT.

This hypothesis fails to find support for the same reasons as hypothesis 2: that there is in this sample a strong and consistent relationship between EFT and RFT scores. The guiding idea behind hypothesis 4, namely that 'g' might exert a stronger influence on EFT performance than the spatial-perceptual "field-dependence" factor, is disconfirmed. But while the hypothesis must be rejected, reservations must be made about the role of 'g' in EFT performance.

For correlations between the EFT and Matrices are highly significant: both for males (0.43, $p < .01$) and females (0.52, $p < .01$). Matrices performance is also significantly related to RFT performance for girls (0.59, $p < .001$). Two points may be made concerning these results. First, it seems more likely that the relationship between Matrices and the EFT rests on the 'g' factor than on the 'k:m.' factor, of which the Matrices has a small loading. This idea is supported by the extremely high WISC-Matrices intercorrelation for girls (0.74, $p < .001$) and by the fact that, though not significant, EFT-WISC correlations are positive and by no means negligible. So the pattern of correlations between the Matrices, WISC, EFT and RFT all suggest an underlying component of the "general intelligence" factor which may be much more important than a spatial factor. Second, the differences between the sexes in the relationships between "intelligence" tests like the WISC (verbal) and Matrices on the one hand, and the RFT on the other, suggest that the EFT-RFT relationship is not as solid as it looks. This point will be dealt with more fully in the next section. It certainly seems that Witkin has relatively neglected the possible effects of 'g' over all "field-dependence" tests.

(c) Specific Hypothesis 5: that there would be significant sex differences on the RFT score, but not on the EFT scores.

It was predicted in the present study that while performance on the RFT, involving a more spatial perceptual factor, would be consistently better for men than for women, performance on the EFT would be much more subject to the influence of intelligence and visual experience, and would improve much more with motivational changes. The results relevant to this hypothesis are presented in table 9.

TABLE 9: SEX DIFFERENCES¹

	N	$\bar{x}$	σ	t	p
EFT(1)	m 33	17.18	6.55	0.90	.15 < p < .20
	f 21	18.94	7.64		
RFT(0)	m 33	55.56	45.1	1.42	.05 < p < .10
	f 21	74.8	54.18		
KOHs	m 33	28.4	6.68	0.80	.20 < p < .25
	f 21	26.7	8.9		

In statistical terms, the hypothesis is not confirmed. However, it seems to be the case that there is a general trend in the direction predicted. While the sex differences on the EFT and Kohs Blocks fall far below significance those on the RFT are almost significant at the .05

¹ Data for the EFT are in table 9 presented in terms of the mean total discovery time over all Ss; data for the RFT, mean Total degrees of error over all Ss. The Kohs Blocks data are raw scores on the test.

level. This suggests that there is some substance to the hypothesis. The performance of males is much better than that of females on the RFT; but only slightly better on the EFT and Kohs Blocks.

The nature of this contrast may be slightly illuminated by reference to table 8, and to arguments touched upon in the preceding section. There does seem to be a general trend for EFT performance among the female sample to be related to their scores on the WISC and Matrices tests; their RFT performance too, is related to intelligence. For males, on the other hand, not only is the relationship of the EFT to the WISC and Matrices Tests a weaker one, but also the RFT seems to bear no relation whatever to these tests. Two suggestions are made, which will be taken up in Chapter 5, as being implied in these findings: (1) the two tests, EFT and RFT, certainly do relate to different functions in male and female Ss; (2) the relationship between EFT and RFT performance is not as stable as it at first appears.

(f) Specific Hypothesis 6: that analyses of the parents' questionnaire responses would prove to have no predictive value in terms of EFT and RFT scores.

If the 'socialisation' hypothesis of Witkin et al. (1962) outlined in Chapter 1 (section 1(c)) has any predictive value, then it should be possible on the basis of questionnaire responses to 'sort' Ss into likely 'field-dependent' and likely 'field-independent' groups. The method by which Witkin et al's (1962) theory of "psychological differentiation" was set up consisted of administering a battery of tests to a child sample, and relating the test results to various indicators of socialisation practices established in interviews with mothers. These indicators were classified as "fostering differentiation" if they were related to a

'field-independent' perceptual style, a high degree of articulation of body concept, and an active, analytical approach to the world. On the other hand, they were classified as "inhibiting differentiation" if they were related to a 'field-dependent' perceptual style, low articulation of body concept, and a global, passive approach to the world.

The Parents' Questionnaire described in section 2(c) above and included in Appendix III was intended to assess some of these aspects of 'socialisation'. Its content has already been outlined. Two methods of examining its relationship to scores on 'field-dependence' tests were adopted.

- (1) Ss were categorised according to their parents' responses to question 3, concerning the frequency and severity of punishment. This was taken as the simplest possible measure of the 'permissive-severe' dimension of socialisation. Then, the two most extreme groups of Ss were selected for analyses, their means on the 'field-dependence' tests computed and tested for the significance of any differences.
- (2) The whole questionnaire was carefully read, and Ss were sorted into one of three separate categories: those whose parents' responses indicated a consistent pattern of 'indicators fostering differentiation'; those whose parents' responses showed a consistent pattern of 'indicators inhibiting differentiation'; and those whose parents' responses failed to show any consistent pattern. This procedure was carried out several months after the testing and was for all practical purposes totally 'blind'. The first two groups were then separated out, and their means on the EFT and RFT compared as in (1).

- (1) Results: The analysis of question 3 of the Parents' Questionnaire yielded a distribution of responses as presented in Table 10.

TABLE 10: RESPONSES IN DIFFERENT 'PUNISHMENT' CATEGORIES

		very often	often	sometimes	seldom	very seldom
GIRLS	19	-	3	10	3	3
BOYS	30	-	3	8	8	11

Parents' responses for two of the girls and three of the boys could not be categorised since they gave no direct indication of the frequency of punishment, but used such phrases as "only when he deserves punishment". Also, as can be observed, there were no Ss whose parents reported using punishment very often. As a test of Witkin's theory, the six Ss (3 male, 3 female) in the category 'often' were compared in their test performance with the 14 Ss (3 female, 11 male) of the category 'very seldom'.

The means of these two extreme groups on the EFT and RFT were then compared by t-tests. The results are presented in table 11.

TABLE 11: PUNISHMENT AND 'FIELD-DEPENDENCE' SCORES

		$\bar{x}$	S.D.	t	p
EFT (°)	'often'	14.72	10.8	0.73	.20 < p < .25
	'very seldom'	17.55	6.46		
RFT (o)	'often'	67.33	61.2	0.09	N.S.
	'very seldom'	64.85	53.5		

Neither of the two differences approached statistical significance; the only conclusion which can be drawn is that there is no detectable relationship in the present sample between the strictness of severity of a child's upbringing, as estimated by his parents, and his performance on the two

principal tasks of the 'field-dependence' battery. Further, it is worth noting that in the case of EFT scores, the difference between the means is in the opposite direction to that which would be predicted by Witkin: those punished relatively more often have shorter mean discovery times.

(2) Results: In practice, the majority of the questionnaires proved to be inconsistent in their apparent degree of 'fostering' or 'inhibition' of differentiation. To some questions, parents responded in a manner suggesting that they encouraged the child's development of independence and nurtured the growth of his separate identity; while to other questions, they responded in a manner suggesting the opposite. Most tended to be inconclusive; and all but those from which a clear pattern emerged were rejected for the purposes of this test. Of the 54 questionnaires, 42 were in this category; a total of 7 exhibited a pattern of consistently "fostering differentiation", while a total of 5 showed a pattern of consistently "inhibiting differentiation".

The means of these two groups on the EFT and RFT respectively were compared as in method (1); the results are shown in table 12

TABLE 12: QUESTIONNAIRE RESPONSES AND 'FIELD-DEPENDENCE'

		$\bar{x}$	S.D.	t	p
EFT (°)	'fostering'	15.86	5.30	1.59	.05 < p < .10
	'inhibiting'	22.18	8.55		
RFT (°)	'fostering'	49.64	51.53	0.97	.15 < p < .20
	'inhibiting'	81.5	62.47		

Again, neither of the differences between the means proved to be statistically significant, suggesting the absence of any clear-cut relationship between the socialisation factors and "field-dependence" scores. It

might be argued, that were the "socialisation" hypothesis of individual differences in field-dependence to be convincing, it might be expected to produce more robust effects than these. If only those Ss were selected whose parents' questionnaire responses gave consistent evidence of a particular style of socialisation, then it might be reasonable, if the theory is valid, to expect these effects to show more clearly.

However, as is evident in Table 12, there is a trend in favour of the "differentiation" hypothesis: the means differ in the direction predicted by the theory, and the *t* value in the case of the KFT closely approaches significance. Two points may be added.

TABLE 13: QUESTIONNAIRE RESULTS AND INTELLIGENCE

		$\bar{x}$	S.D.	<i>t</i>	<i>p</i>
Matrices	'fostering'	38.25	5.43	1.55	.05 < <i>p</i> < .10
	'inhibiting'	30.8	11.17		
WISC (Verbal)	'fostering'	62.0	2.63	0.71	.20 < <i>p</i> < .25
	'inhibiting'	58.6	2.45		

First, as Table 13 shows, these groups may also differ in intelligence: Ss from homes which 'foster' differentiation have higher mean Matrices and WISC (Verbal) Scores. This may suggest either that the difference in '*g*' or in some spatial factor is fundamental (note that the Matrices comparison approaches significance), or that the groups differ in their reactions to the test-taking situation. The data cannot unfortunately throw light on this. Second, and more generally, it may be that 'socialisation' is an important influence on 'field-dependence' scores, after which other factors, such as intelligence, education, etc., supervene; or that socialisation

is related to 'field-dependence' through the mediating factor of intellectual stimulation rather than through Witkin's "Dependence-independence" dimension. The data of Tables 12 and 13 may be a reflection of these factors acting in concert.

In conclusion, despite these reservations, it seems that Hypothesis 6 is not disconfirmed, and that the link proposed between socialisation and "field-dependence" scores by Witkin et al. (1962) is not adequately substantiated. The issues which these findings raise will be discussed more fully in Chapter 5.

The possible effects of general intellectual factors have been detected in almost every piece of evidence which has been presented above. One principal aim of this thesis is to attempt to distinguish the extent to which this 'g' factor, and not a personality factor, is responsible for individual differences on "field-dependence" tests. This topic, together with a number of related ones, is taken up in the chapter which follows.

CHAPTER 4: INVESTIGATION II

CHAPTER 4.1. Introduction: Investigation II

Three crucial hypotheses of the first investigation were not verified. These were (1) that the relationships normally found in Western samples between the EFT and the RFT would break down in the Chinese sample, i.e., the "field-dependence-independence" dimension would fragment; (2) that correlations between the EFT and Matrices (as a test of general intelligence) would be significantly higher than those between the EFT and the RFT; and (3) that EFT scores would be significantly related to scores on a Chinese language test.

Nevertheless, on the basis of the findings of the previous chapter, I find more room for dissatisfaction than before with the theory of "field-dependence-independence". In comparison with American Ss, the Chinese sample did not perform as Witkin would have predicted; and the effects of socialisation failed to appear in any clear and convincing way. Most important of all, at each stage of the investigation the role of intellectual ability in influencing test performance was evident in some form. I decided to investigate the relationship between general intelligence and "field-dependence" in greater detail, and thus Investigation II was deliberately designed to throw light on the effects of intellectual factors on EFT scores and their relationship to the RFT, and involved the use of a larger and more comprehensive intelligence Test.

A number of subsidiary aims were served by this second sampling. First, I reasoned that, while in a younger sample the effects of socialisation might well be a maximum, the testing of older Ss might help demonstrate the growth of importance of other factors, such as intelligence,

as age progresses. Secondly, I decided to try to refine the exploration of socialisation processes, by asking Ss to rank themselves on a number of separate variables.

(a) Education in Hong Kong University.

The subjects chosen as testees in the second sample were male second year students in the University of Hong Kong, in two groups, one each from the faculties of Science and Arts. There were 20 Ss from the second-year Mathematics and Physics Class, and 14 from the second-year Chinese literature class, part of the faculty of Arts.

The testing of University students brought with it a number of advantages; the most important of these was that all Ss spoke and understood English - the testing medium was the English language, and all tests were administered by E directly. In addition, it was possible to control more rigorously for the education environment of the Ss. Thus the role of intellectual factors could be examined in closer detail.

Hong Kong has two Universities, Chinese and English; the latter, in which the testing was carried out, is essentially a British-style University in which classes, curricula, and departments are organised on British lines, and the medium of instruction is English. Competition for entry into this University is extremely intense: the entrance examinations are generally acknowledged to be at a standard above that of the G.C.E. in England, yet the University, in a colony of approximately four million inhabitants, has only three thousand students; and only a limited number of Government financial awards are made each year. The level of competitiveness in examinations can thus well be imagined: and it seems probable that this competitiveness transferred to the testing situation.

The principal disadvantage of testing students from another culture who have been subjected to a rigorous Western-type education is that the test results reflect much more the effects of this education than they do any of the underlying features of the culture itself. Thus to a certain extent, test results emerge, as it were, very much in the way in which Ss have been taught to produce them. Factor analyses of African ability, for example, as discussed by Vernon (1969), inevitably yield similar results to those found in Britain, possibly because Ss have been taught in British schools, and given British tests. Statements about relationships between test scores and "basic" cultural variables should be made in the context of the educational system (in this case, Western) which acts as an intermediary between them.

(b) the choice of sample

In selecting the Ss of the second sample, an attempt was made to assess the impact of different kinds of educational experience on performance in the tests of the battery. The two groups of Ss chosen were intended to represent two extremes of the academic spectrum. Thus a number of effects could be examined together: the respective roles of Verbal and spatial-perceptual intelligence; the impact of familiarity with Chinese characters; while the effects of socialisation, if any, could be examined across both groups.

The general ideas behind the choice of Ss were similar to those involved with sample 1. It was hoped that the effects of general intelligence could be shown to be crucial in their impact on scores on the EFT; that for all Ss, these effects would be so strong as to cause the test to "detach itself" statistically from its relationship with the RFT; and that, despite their expected relative inferiority in spatial tests, the

Chinese literature students might perform up to the level of the Mathematicians and Physicists on the EFT: I expected that, where the science students would have spent more time reading English, the literature students would have excessive familiarity with the tasks of reading Chinese, a form of extended 'practice' effect which might transfer to the EFT. It was further hoped that a clearer demonstration could be made of the relative independence of perceptual test scores and socialisation. The particular hypotheses relating to these various ideas are presented in section 3 below.

(c) Characteristics of Ss tested

The subjects of the sample were 34 male Chinese second year University students, 20 in the B.Sc. Mathematics and Physics course, 14 in the B.A. Chinese Literature and History course. For strict comparability with the results of Witkin et al. (1962) an all-male sample is more appropriate. These Ss were contacted via the medium of the University's Science Society and Chinese Society respectively. The Secretaries of these societies were first asked if they would be willing to provide a list of names of potential Ss; this they did, and Ss were mostly contacted by telephone and a testing time arranged. None of the Ss were known to E and there was no reason to assume that in adopting the method of telephoning randomly selected individuals from a list of each society's members, that E was biasing the sample in any particular way (unless it be assumed that only field-independent Ss, for instance, will be obliging or co-operative). None of the Ss had ever taken a course in the psychology department and all were totally naive as to the purposes and methods of the testing.

TABLE 14: CHARACTERISTICS OF SS IN SAMPLE 2.

	<u>Maths/Physics</u>	<u>Chinese Lit./Hist.</u>
	N=20	N=14
Mean Age: year and months	21:7	22:3
Mean No. of years of schooling	14.9	14.07
Mean No. of siblings	3.75	4
Father's Occupation Group ¹		
Unskilled manual	1	1
Semiskilled Manual	3	1
Skilled Manual	4	2
Lower Clerical	4	6
Lower Professional	3	3
Upper Professional	4	1

The mean age, years of schooling and number of siblings for Ss in the two groups are presented in table 14, together with the numbers of Ss in each of the occupational groups, classified as sample 1. (The father of one S was deceased and is not included.) A check was also made concerning the length of time for which Ss had been resident in Hong Kong. Of the science sample, hereafter referred to as the M/P sample, 18 had always lived in Hong Kong, the other two had been resident for twelve and seventeen years respectively; of the Chinese literature sample, hereafter called C/L sample, 11 Ss were lifelong residents of Hong Kong, the remaining three having been there for fourteen, fifteen and seventeen years respectively. No S had spent any lengthy period abroad, with the aforementioned exceptions. Thus it was considered that the cultural environment for these Ss was as uniform as could be expected (those not born in Hong Kong had come, of course, from China).

¹ see footnote 3, p. 80.

Additional information was also gathered, as will be described below, concerning the level of education of the Ss' parents, in an attempt to investigate the role, if any, of parental education in fostering "field-independence".

Thus these two groups were roughly matched in age, years of schooling, numbers of siblings, length of stay in Hong Kong, experience of University, and were sampled in roughly similar proportions from the various social classes.

2. The Test Battery: Methods and Procedures of additional Instruments

(a) The Tests used

The tests administered to the Ss just described were the following:

- (1) The Ishihara test;
- (2) Raven's Progressive Matrices;
- (3) The Embedded Figures Test;
- (4) The Portable Rod-and-Frame Test;
- (5) The Wechsler Adult Intelligence Scale;

In addition, each S was given a questionnaire concerning his early family experiences, administered verbally and completed in the testing session.

(b) The test sessions

Testing was arranged by E for a time suitable to S, and conducted in a large room in the Department of Psychology of Hong Kong University. E and S faced each other across a table, with the test material between; the Rod-and-Frame Test was positioned on a separate table, with a chair in the appropriate position. The language medium was English, which all Ss

understood well; still, considerable care was taken, in explaining the test items, and in ensuring that the response given was the one intended. The reliability and validity of tests inevitably falls under such circumstances; this is a condition which cross-cultural testing can scarcely avoid. The order of presentation of the tests was as given above, with the priorities of keeping S interested in mind. The Wechsler Adult Intelligence Scale, though lengthy, contains a considerable variety of items which are quite stimulating to most Ss.

(c) Procedure: The Wechsler Adult Intelligence Scale

The Ishihara, Progressive Matrices, Embedded Figures, and Portable Rod-and-Frame Tests were all administered exactly as described in Chapter 3. The Children's Embedded Figures Test was not included for obvious reasons; Landolt Rings, too, were excluded, as not really being necessary; most Ss were capable of telling whether they could see the test material clearly or not. Finally, the Kohs Block Designs test is, of course, part of the Wechsler Adult Intelligence Scale.

The last test is the only new item of the Sample 2 Test Battery. It consists of 11 sub-tests, in two scales, Verbal and Performance; the score on each is combined to give an intelligence quotient which relates S's score to that of other individuals in his own age group: such IQ's are normally distributed with a mean of 100 and a standard deviation of 15. The test was administered as directed in the Manual (Wechsler, 1958), and modifications were introduced only in a few places where they were thought to be necessary. These are listed in Appendix II, together with sub-test details.

For each sub-test, the total score obtained is converted to a scaled score, of which there are tables in the manual and on the scoring sheet

used by E. Scaled scores are then summed, separately for verbal and performance scales, and total test scaled score, and converted by means of tables to verbal IQ, performance IQ, and full scale IQ respectively. This last operation takes into account S's position relative to other members of his own age group. The final IQ's were the raw data from which the results of this study were devised.

Scoring of the WAIS was carried out by E on the forms provided. Ss for the most part seemed to enjoy taking this test; all understood the nature of the items. Where requested, the Digit Span Test was conducted in Cantonese, using E's limited knowledge of that language.

For the most part the Ss did not seem to perform adversely due to being tested in English on an American test. It is probable that overall their scores would have been higher had the test been conducted in Cantonese throughout; higher still had there been a locally modified and standardised version. However, it can be maintained that the use of the test is justified, in that it may be assumed to be equally biased against all of them; a relative ordering within the sample can thus still reliably be carried out. It is possible, though, that Ss in the C/L group were marginally worse off in this respect; they were likely to be a little less familiar with Western information and methods. This possible adverse effect will be taken into account in assessing the results.

The scores of all the tests were arranged together by subject, and are presented in tabular form in Appendix I.

Questionnaire II: Socialisation

In addition to the introduction of the WAIS, a new questionnaire was prepared for the Ss of sample 2. It consisted, apart from data

questions on age, years of schooling, etc., of a series of 27 questions relating to aspects of socialisation and family background. These were selected with reference to (a) the Harvard Home Interview Schedule, (as with the questionnaire given to parents of children in sample 1) used in the research of Seder (1957); and (b) some questions used by Vernon (1969) in his cross-cultural research on intelligence, in an attempt to explore a number of factors of home background as these related to performance on his test battery.

As with the use of the questionnaire in sample 1, the aim of this assessment was to obtain information concerning the relative degree to which S's relationship with his parents could be said to be one 'fostering' or 'inhibiting' psychological 'differentiation'. The general lines along which this inquiry was conducted were again those described in the work of Witkin et al. (1962). However, in addition to exploratory questions concerning the frequency of punishment in S's infancy, his parents' reactions to transgressions of their code, and the relative degree to which they encouraged him to be independent of them, a number of 7-point rating scales were introduced on which S was asked to rate himself, his home, or his parents on a variety of simple dimensions.

These were introduced on the questionnaire as follows: "The following questions consist of scales on which you are asked to rate yourself according to the degree to which something is true or untrue of you; the two ends of each scale represent opposite extremes with regard to the variable in question."

The seven-point rating scales, nine in number, consisted of the following: (1) parental aspiration scale; (2) level of stimulation in the home; (3) parental 'protectiveness vs. encouragement'; (4) parental

'severity vs. permissiveness'; (5) a self-rating on 'dependence-independence'; (6) self-rating on the scale 'easy-going vs. worried'; (7) father strictness; (8) mother strictness; and (9) a self-rating on 'independence of mind'.

These scales were not presented together, in a body, but were scattered amidst the other items of the questionnaire, and integrated with them. The complete questionnaire may be inspected in Appendix III.

Three items of the questionnaire were based on ideas derived from the work of Vernon (1969): the first two of these concerned the highest level of education achieved by S's mother and father respectively, and the third was the rating scale, "would you say that your home is a very stimulating one?" It was thought that a relationship might be found between the kind of education of S's parents and his performance on "field-dependence". Such a relationship would be predicted, of course, by Witkin's theory; parents who were themselves more "differentiated" would tend to rear more "differentiated" children (Corah, 1965); but if such a relationship were found in the absence of any evidence that this operated through the medium of child-rearing practices, then an alternative explanation might be offered in terms of the presence of a greater variety of rewarding stimuli in the homes of parents of higher educational achievement.

The questionnaires, in stencilled form, were administered in the testing session immediately after the completion of the Ishihara and before the administration of the Matrices. Ss did not seem to encounter any difficulty with the rating scales; it was thought that the rating scale might be in some way antithetical to the Chinese manner of conceptualisation, but there was no suggestion of this in the administration or in the responses.

These are the methods by which the data were collected. The next section states the hypotheses in testable form, before going on to a discussion of the results in section 4.

3. Specific Hypotheses

The hypotheses under test in Investigation II were the following:

- (1) that Ss would perform in a relatively more "field-independent" manner than their American counterparts on the RFT and EFT; following the parallel hypothesis in Chapter 3, the reasons behind this hypothesis lie in the hypothetical position that intelligence, education, motivation and exposure to the Chinese language are the chief determinants of scores on tests of "field-dependence"; (Cf. Pp. 23-29, 43-49, 64-72).
- (2) that the high EFT-RFT correlations normally found in Western studies would not be found with the present sample; because, owing to experience with Chinese characters, these Ss would perform better at disembedding tasks in a purely visual medium than at those involving a proprioceptive medium; and because the EFT would be more closely related to intelligence test scores than the RFT.
- (3) that the correlations between the EFT and WAIS, and between the EFT and Raven's Matrices, would be significantly higher than those between the EFT and the RFT. This reflects the hypothetical position that EFT scores would relate much more closely to a general intellectual factor than to a "field-dependency" or "disembedding" factor; whereas EFT scores would not. (Cf. Pp. 43-47).
- (4) that while differences between the M/P and C/L groups would be significant on the RFT (C/L making more errors), no such differences would be found on the EFT; this reflects the idea that Chinese language

experience would tend to bring EFT scores to a more uniform level, whereas RFT scores would be related more closely to a spatial factor, which one would expect to be higher in the M/P group.

- (5) that analyses of questionnaire responses in terms of socialisation variables (a) punishment and (b) rating scales would have no predictive value in terms of EFT and RFT scores; this is the corollary of the general hypothetical position that "field-dependence" scores are dependent to the largest extent on general intellectual, educational and visual experience factors (Cf. Pp. 14-16, 21-23, 64-70).
- (6) that levels of parents' education would have predictive value in terms of EFT scores: Ss with parents who had higher levels of education (years of schooling) showing lower mean discovery times. This is an attempt to find general support for the idea that an important feature of home background is the overall level of "stimulation" available in the home, which I assume to be related to parents' educational level. (Cf. Pp. 47-49.)

4. General results, and discussion of the fate of each hypothesis.

The raw data for this sample are presented in Appendix Ib. All correlations were computed by the Spearman rank-order method. For comparisons between means, the t-test was used.

Means and Standard Deviations are presented in table 15. No final attempt was made to match the two groups in intelligence: it is probably not possible, as Hudson's (1966) work implies, to match an arts and a science group on tests of "convergent thinking". In any case, the main focus of interest here is on patterns of scoring WITHIN each group.

- (a) Hypothesis 1: that Ss would perform in a manner relatively more "field-independent" than their American counterparts on the RFT and the EFT.

TABLE 15: MEANS AND STANDARD DEVIATIONS: UNIVERSITY SAMPLE

	MATHS/PHYSICS N=20		CHINESE LIT. N=14	
	$\bar{x}$	S.D.	$\bar{x}$	S.D.
WAIS	122.4	7.37	115.9	4.44
MATRICES	51.85	6.6	43.5	8.04
EFT (sec/trial)	20.23	15.03	37.63	24.46
RFT ($^{\circ}$ error/ trial)	2.48	2.06	4.475	4.7

TABLE 16: SAMPLE 2 COMPARISONS WITH AMERICAN SCORES

		M	S.D.	t	p
RFT:					
College					
Males: New York	N=34	5.61	3.72		
HKU: M/P	N=20	2.48	2.06	3.8	<.005
HKU: C/L	N=14	4.475	4.7	0.83	.20 < p < .25
EFT:					
College					
Males: New York	N=34	47.99	23.88		
HKU: M/P	N=20	20.23	15.03	4.67	<.005
HKU: C/L	N=14	37.63	24.46	1.36	.05 < p < .10

The data on which this comparison is based are those presented by Okonji (1969) in a comparison between New York Ss and Nigerian groups.

The New York Ss were also, it should be noted, undergraduates. Table 16 presents the comparison between these groups: data are mean solution times per figure on the EFT, and mean degrees of error per trial on the RFT. In this case too it was possible to make a statistical comparison, using t-tests, between the means of the New York and the two Hong Kong University groups: the value of t quoted is that computed by comparing the corresponding Hong Kong groups with the New York group immediately above.

Again in sample 2, we have evidence of strikingly high scoring among Chinese samples. The EFT and RFT performance of the Physics group are both significantly better than their New York counterparts; and though for the C/L group the differences are not significant, their performance remains superior to that of New York Ss, and closely approaches significance. Again also, it does not seem to be possible to account for these differences in terms of the Standard Within-Dawson-Berry hypothesis. Though a highly intelligent sample, Hong Kong Ss should, if the socialisation hypothesis is to remain intact, be at least as field-dependent as, if not more field-dependent than, a corresponding New York sample. Of course this cannot be said with any certainty in the absence of strictly comparable intelligence scores. However, it seems to me that an explanation in terms of motivation and visual experience is the most likely one: Motivation to succeed in tests is probably much higher in Hong Kong than in even New York; and it is noteworthy that the t values for the EFT comparisons are consistently higher than those for the RFT comparisons; however, any attempt to relate this to the effects of "training" on the reading of Chinese characters is bound to be pure speculation.

In general, hypothesis 1 is supported, spectacularly in the case of

the EFT, though the precise implications of these differences are difficult to assess.

(b) Hypothesis 2: that the high EFT-RFT correlations normally found in Western samples will not be found with the present sample.

The testing of this hypothesis and the next must be referred to table 17, in which are presented the test intercorrelations for sample 2.

Hypothesis 2 is partly supported by the evidence of Table 17. While amongst the Chinese literature sample the correlation is 0.63 ($p < .01$) and the standard relationship obtains, among the Mathematics/Physics group the relationship has broken down completely and the correlation between the EFT and the RFT reaches a value of only 0.095. In fact, amongst the M/P sample, there is considerable doubt as to what the RFT is meaning, since it bears no relation to either the EFT or the WISC and Matrices Tests. This is in striking contrast to the findings of the 9-year-old sample, in which the RFT was correlated highly with the EFT (for males, 0.66, $p < .001$; for females, 0.62, $p < .001$), and also showed a significant relationship to both the WISC and Matrices tests for girls (0.52 and 0.59 respectively, $p < .01$). For the C/L sample, however, as can be seen from the table, the pattern of correlations for the RFT is similar to that amongst the 9-year-old sample. Thus it seems clear that some kind of fragmentation has taken place in the 'field-dependence-independence' dimension. The RFT behaves completely differently in two different samples of students taken from one University. This suggests considerable instability in the hypothesized underlying dimension of 'field-dependence'; it seems doubtful

whether the construct can retain any explanatory value when it can be disturbed in this way among adult subjects.

TABLE 17: TEST INTERCORRELATIONS: SAMPLE 2¹

		RFT	WAIS ²	MATRICES
EFT:	M/P N=20	.095	.67**	.32
	C/L N=14	.63**	.86***	.46*
MATRICES:	M/P N=20	.10	.39	
	C/L N=14	.53*	.51*	
WAIS:	M/P N=20	.0082-		
	C/L N=14	.53*		

(c) Hypothesis 3: that the correlations between the EFT and the WAIS, and between the EFT and the Matrices, would be substantially higher than those between the EFT and the RFT

This is the corollary of hypothesis 2 and can also be tested by reference to table 17. Again, though the evidence is not wholly supportive, the hypothesis is substantially borne out by the pattern of intercorrelations. The most striking case is the much higher correlation between the EFT and the WAIS (for the M/P sample) than between the EFT and the RFT; this difference, however, is not significant ($z = 1.68$). Also, while, as already noted, the correlation of the EFT with the RFT remains

¹ * $p < .05$ ** $p < .01$ *** $p < .001$

² Unfortunately WAIS data are available for 12 C/L Ss only.

intact for the C/L group, the EFT-WAIS correlation is even higher - and massively significant - for this group also. Thus the general prediction that the EFT would behave much more as a function of general intelligence than as a function of a personality-perceptual dimension is verified. Further, it cannot be objected that the high correlation of the EFT with the WAIS in the M/P group is a product of its relationship with tests of the performance scale, for instance Kohs Blocks: for if separate correlation coefficients are computed with the WAIS Verbal and Performance Scales they are found to be 0.58 and 0.37 respectively. This raises a point sadly glossed over by Witkin et al. (1962). Though they maintain that their perceptual ('field-dependence') index is more closely related to spatial ('intellectual') than to verbal tests, occasionally the reverse is the case: witness their correlation of 0.56 ($p < .01$) between 'field-dependence' and Stanford-Binet vocabulary scores with 24 Ss (P.190); or the not infrequently close relationship between verbal scores and the personality correlates of 'field-independence'.

These findings constitute a cogent criticism of the 'differentiation' hypothesis of Witkin et al. (1962) and suggest that the determination of scores on such a test as the EFT are a complex function of many variables, and cannot be subsumed under a theory which relates their genesis to socialisation processes or child-rearing practices. As the most clear-cut and well-established so far to emerge, they will be discussed more fully in Chapter 5 where their full significance can be taken into account.

- (d) Hypothesis 4: that while differences between the M/P and C/L groups would be significant on the RFT (C/L making more errors), no such differences would be found on the EFT.

This hypothesis reflects a complex set of considerations. First of all, it is plausible that, given that the EFT is a much more purely visual task than the RFT, Ss who are exposed to the "disembedding" task of reading Chinese characters are likely to perform better on the EFT than on the RFT. Secondly the EFT scores of the M/P group would be boosted by their higher level of general intelligence, whereas those of the C/L group might be higher because of their relatively greater familiarity with Chinese characters. On the other hand, I would expect the RFT performance of the M/P group to be significantly superior to that of the C/L group, since this test involves a spatial (possible genetic in origin) component and involves the postural medium.

However, as Table 18 shows, in fact the findings were almost the reverse of this, and the hypothesis was not supported. The most obvious explanation is in terms of intelligence. For both groups, the EFT was highly correlated with the WAIS; whereas the RFT was not, and only in the

TABLE 18: GROUP DIFFERENCES IN EFT AND RFT SCORES

		M	S.D.	t	p
EFT ¹	M/P N=20	20.23	15.03	2.57	<.01
	C/L N=14	37.63	24.46		
RFT ²	M/P N=20	2.48	2.06	1.69	<.05
	C/L N=14	4.475	4.7		

¹ Mean time (in seconds) per figure for the group as a whole.

² Mean degrees of error per trial for the group as a whole.

C/L group did it show any connection with the RFT. Also, the WAIS mean was higher for the M/P group than for the C/L group; Physicists and Mathematicians normally perform better on intellectual and spatial-perceptual tests than Arts groups; and the significant group difference in RFT score in Table 18 is probably due to differences in spatial ability. All of this points to the final conclusion; that the idea that familiarity with the Chinese language might enhance performance on a test of over-coming embeddedness in either untestable or inaccurate. The "embeddedness" factor is probably only present during the initial learning of the language, but not later, due to the nature of the ideograms. Thus these results have failed to show any effects of such a specific perceptual skill as reading Chinese on performance on a perceptual test. It is most probably the case that the skills are too dissimilar for any transfer effects, even if they were to occur, to be detected.

(c) Hypothesis 5: that analyses of questionnaire responses in terms of 'socialisation' variables (a) punishment and (b) rating scales would have no predictive value in terms of EFT and RFT scores.

(a) Punishment. The method used to test the first part of this hypothesis was identical to that used in section 4(f)(1) in Chapter 3 above, except that in this case the 'punishment categories' and responses to them were provided by Ss themselves and not by their parents. However, the categorisation was the same: one item on the Ss' questionnaire asked him how often, in infancy, his parents had been likely to punish him; and the categories - very often, often, sometimes, seldom, and very seldom - were organised in the same way, according to the numbers of Ss allocating

themselves to each. However, in this sample, Ss confined themselves for the most part to categories 3 (sometimes) and 5 (very seldom) of the scale. In order to obtain extreme groups, it had been hoped that Ss would spread themselves out much more, but this did not occur. A significance test was therefore carried out on the mean EFT and RFT scores of the Ss in the relatively extreme categories 3 and 5.

TABLE 19: FREQUENCY OF PUNISHMENT AND 'FIELD-DEPENDENCE':
UNIVERSITY SAMPLE.

	EFT (')				RFT (°)			
	$\bar{x}$	S.D.	t^1	p	$\bar{x}$	S.D.	t^1	p
MATHS/PHYSICS								
'sometimes' N=8	5.89	4.7	1.30	.10<p<.15	21.87	16.82	0.81	.20<p<.25
'very seldom' N=4	2.72	0.91			14.62	6.6		
CHINESE LIT.								
'sometimes' N=6	8.8	6.15	0.40	.30<p<.35	33.25	27.66	0.30	.35<p<.40
'very seldom' N=6	7.58	4.05			41.73	17.21		

¹ From the table it can be seen that the standard deviations of the two groups under comparison are in several cases quite disparate. This was in the event unavoidable and occurs in a few of the significance tests to follow. However, as Edwards (1967) points out, the t-test is fairly robust, i.e. it is relatively insensitive to even quite marked violations of its statistical assumptions.

This procedure does not unfortunately permit a really satisfactory testing of the hypothesis. The results, presented in Table 19, do not show any significant differences between the two groups. The hypothesis is verified, in that Witkin's prediction of a relationship between frequency of punishment and level of "field-dependence" fails to find support. However, Witkin might argue that it is unlikely that results in support of his predictions would emerge in these circumstances, in view of the small numbers and the nature of the comparison made (between criterion groups of no great "rearing" difference).

(b) Rating Scales. Seven of these, relevant to the testing of this hypothesis, were used in an attempt to make a more thorough examination of the possible role of socialisation factors in determining "field-dependence" scores. The method adopted was as follows. The position of each S was recorded on each rating scale during the administration of the questionnaire. Since each scale represents a dimension in some way related to the development of "differentiation", Witkin's own (1962) terminology was adopted. One end of each 7-point rating scale was to represent "indicators fostering differentiation", e.g. MORE permissive, MORE encouraging, MORE independent, and so on; while the opposite end was to represent the maximum level of "indicators inhibiting differentiation", e.g. MORE strict, MORE protective, MORE dependent, etc. The various points on the rating scales were thus scored nominally from +3 (maximum level of "indicators fostering differentiation") to -3 (maximum level of "indicators inhibiting differentiation").

Ss were then categorised, according to this ranking system, on each of the seven rating scales thought to be most clearly related to the

concept of "differentiation", and the numbers of Ss in each category were summed together. Table 20 presents these results.

TABLE 20: PRINCIPAL INDICATORS OF DIFFERENTIATION

		+3	+2	+1	0	-1	-2	-3
Parent Aspirations	M/P	3	8	2	4	1	1	-
	C/L	1	5	4	1	-	-	2
Home Stimulation	M/P	2	5	-	5	1	5	2
	C/L	2	2	4	2	1	1	2
Protective-encouraging	M/P	1	4	2	6	1	6	-
	C/L	1	2	1	5	2	2	1
Permissive-severe	M/P	3	4	2	5	6	-	-
	C/L	2	6	-	5	1	1	-
Independence Rating	M/P	2	6	3	3	4	2	-
	C/L	2	5	3	1	1	2	-
Father Strictness	M/P	2	6	2	1	2	3	1
	C/L	3	6	-	2	1	2	-
Mother Strictness	M/P	3	5	5	3	3	-	1
	C/L	3	3	3	3	-	2	-

In order to test Hypothesis 5, a series of comparisons were made, on EFT and RFT scores, between those groups of Ss at opposite ends of each scale. Any effects of "socialisation" or "field-dependence" scores would then be reflected in differences between the means of the two groups in each comparison. That is, if the "psychological differentiation" theory has any predictive value, I would expect that those Ss who rated themselves as coming from 'more strict', 'more protective' family backgrounds would be relatively more "field-dependent" on the EFT and RFT than those who rated themselves in the opposite manner. Should such differences fail

to appear in the majority of comparisons, I would claim that the "psychological differentiation" theory of Witkin et al. (1962) is an inadequate formulation of the relationship between socialisation processes and field-dependence scores, and that an explanation of individual differences in 'field-dependence' tests must be sought somewhere other than in childhood.

A major difficulty which emerged in this analysis, however, was the fact that Ss were rather unevenly distributed on many of the scales, and in many cases the categories at the ends of the scale were either empty (a not uncommon finding) or had too few members. Accordingly, each scale was treated independently and a simple comparison of those in the 'higher' indicator areas with those in the 'lower' was carried out. Individuals from adjacent categories, for example -2 and -3, were classed together and compared with individuals from +2 and +3. A possible testing of the significance of the differences between the means (on EFT and RFT) of groups of Ss tending towards the +3 and the -3 ends of each scale was carried out, for all relevant scales except that of Parent Aspirations for the C/L group.¹

Table 21 presents the results of this analysis. Of 26 comparisons only two are significant in the direction which would be predicted by Witkin. Of the remainder, approximately half are in the expected direction but insignificant, and the other half are in the opposite direction.

¹

This comparison could not be made owing to the distribution of the responses.

TABLE 21: INDICATORS OF 'DIFFERENTIATION' AND 'FIELD-DEPENDENCE'¹

	DET		RFT	
	t or U ²	p	t or U	p
MATHS/PHYSICS:				
Parent Aspirations	1.64+	.05 < p < .10	2.63+	< .01
Home Stimulation	1.00+	.15 < p < .20	0.23-	.40 < p < .45
Protective-encouraging	0.27+	.35 < p < .40	0.13-	.40 < p < .45
Permissive-severe	0.75+	.20 < p < .25	0.59-	.25 < p < .30
Independence rating	0.63-	.25 < p < .30	0.47+	.25 < p < .30
Father Strictness	0.30-	.35 < p < .40	3.15+	< .01
Mother Strictness	0.50-	.30 < p < .35	1.21-	.10 < p < .15
CHINESE LITERATURE				
Home Stimulation*	7-	.44	6-	.34
Protective-encouraging*	7-	.27	5-	.14
Permissive-severe	0.03-	NS	0.09+	NS
Independence Rating	1.08+	.15 < p < .30	0.63+	.25 < p < .30
Father Strictness*	17+	NS	18-	NS
Mother Strictness	0.12+	NS	0.11+	NS

On the whole, the evidence does not support the Witkin hypothesis, and Hypothesis, 5, that analyses of questionnaire responses would have no predictive value in terms of "field-dependence" scores, is confirmed, though not strongly: it cannot be proved true but remains tenable.

¹ + Indicates that the difference is in the direction which would be predicted by Witkin.
 - Indicates that the difference is in the direction opposite to that which would be predicted by Witkin.

² Where possible, t-tests were used. However, in a number of cases (those marked *), in which the numbers were small and the variances were somewhat heterogeneous, Mann-Whitney U-tests were carried out instead. The probability values were obtained from tables in Siegel (1956).

It might be objected that no really searching test of the theory has been carried out; the groups were rather small and often they did not really represent 'extremes' of a distribution. Further, two of the comparisons do support the Witkin theory: but a closer look will show that each of these is problematical. Firstly, that "father strictness" and not "mother strictness" should be significant in the case of M/P RFT scores, is not exactly what would be demanded by Witkin's theory, in which the role of the mother is held to be crucial; though adventurous anthropological theorising might postulate a reversal of the pattern of parental influence in Chinese culture. Secondly, the fact that "parent aspiration level" discriminates between high and low RFT scores in the M/P group may well reflect the role of motivational factors (achievement motivation, test orientation etc.) rather than the role of parents in helping S to develop a differentiated self-concept. This may also help to explain why this comparison approaches significance in the case of the EFT also.

(f) Hypothesis 6: that levels of parental education would have predictive value in terms of EFT scores: Ss whose parents had had more years of schooling would show lower mean discovery times.

Using the data gathered in Questionnaire II on the educational level of Ss' parents, two groups of Ss were sorted according to the following pattern: (a) those whose father had had three or more years of secondary schooling, and whose mother had had primary schooling - designated the 'high' group; and (b) those whose father had had some primary schooling, but whose mother had had no schooling at all - designated the 'low' group.

TABLE 22: PARENTAL EDUCATION AND 'FIELD-DEFINITION'

		EFT ¹				RFT ²			
		M	S.D.	t	p	M	S.D.	t	p
MATHS/PHYSICS									
High Group	N=6	4.33	1.39	1.87	<.05	12.33	5.72	1.28	.10<p<.15
Low Group	N=6	7.14	3.38			24.75	23.05		
CHINESE LITERATURE									
High Group	N=5	5.13	2.01	1.07	.15<p<.20	18.87	12.64	0.65	.25<p<.30
Low Group	N=4	9.21	7.25			35.4	48.73		

These two groups, both in the M/P and C/L samples, were then compared in terms of EFT and RFT scores. The results presented in Table 22, are in accord with the hypothesis: those Ss whose parents have had a higher level of schooling have lower EFT discovery times and RFT scores, though only the result with the EFT for the M/P group reaches statistical significance.

This significant result cannot be attributed solely to intellectual factors: a comparison between the mean WAIS scores of the 'high' and 'low' groups was nonsignificant ($t = 0.80$, $.20 < p < .25$). Nor, it seems to me, can it be attributed to differences in the extent to which these parents have "fostered differentiation" in the Ss: it does not seem plausible to argue that these few years of schooling would alter mother-child interaction patterns of the kind with which Witkin is concerned. But it is plausible, I think, to argue in terms of the idea that the home

¹ Mean total discovery time (°) for the group.

² Mean total error (°) for the group.

environment is different to the two groups of Ss: different in the amount and kinds of stimulation available, in activity level, and in the degree of motivation to succeed which is inculcated in the child. It is unfortunate that only a much larger scale of study would enable us to decide between these alternative possibilities.

In summing, it now seems that the objections to Witkin's theory outlined in Chapter 1 are in a much stronger position. Of the six hypotheses tested in Chapter 4, five have been substantially supported by the evidence. The implications of this are discussed in detail in Chapter 5 which follows.

CHAPTER 5: GENERAL DISCUSSION

CHAPTER 5.

The aims of this final chapter are: (1) to briefly set out Witkin's theoretical position and my own; (2) to review the results of Chapters 3 and 4 and relate them to these theoretical positions; (3) to criticise some defects of the present thesis; and (4) to suggest some future research.

1. The Theories.(a) Outline of the basic tenets of Witkin's theoretical position

The work of Witkin et al. (1954, 1962) led to the formulation of a theory with a number of basic propositions. First, that individuals' performances on perceptual tests, like the EFT and the RFT, could be characterised as varying along a dimension of "field-dependence-independence", which referred to the individual's capacity to isolate elements of his experience from the 'field' in which they were embedded. Second, that individuals are relatively stable in their capacity on this dimension, and that males' performance is superior to that of females (i.e. they are more 'field-independent'). Third, that the principal determinant of an individual's capacity in this respect (his "cognitive style") is the socialisation process to which he has been exposed, and in particular the degree to which he has developed a sense of identity separate from that of his mother in early infancy.

Witkin acknowledges in addition (1) that an S's level of performance on 'field-dependence' tests improves slowly with development, but that his position relative to other Ss remains the same; (2) that there is a certain (perhaps hereditary) intellectual component involved in 'field-

dependence-independence', but that the personality ('differentiation') factors are the most basic. This, though brief, is a rough outline of his position.

(b) Basic tenets of my own theoretical position.

In view of the literature considered in Chapter 1, my own contentions are that (1) performance on the various tests of the 'field-dependence-independence' dimension is not stable, but susceptible to the effects of practice, motivation, the nature of materials, etc., and that the various tests may not be related to each other on a single dimension; (2) intellectual factors, and specialised kinds of experience (education, reading Chinese, familiarity with geometrical forms) will account for a much larger proportion of the variance in EFT or RFT scores than will socialisation. Thus I am objecting to the Witkin hypotheses on two levels: the descriptive (his dimension of individual differences is liable to fragment) and the 'causal' (intelligence and "peripheral" experiences are the principal determinants of so-called 'field-dependence' scores).

2. Overview of the present findings.

The findings of my own research with Hong Kong Chinese presented in Chapters 3 and 4 may be summarised in a number of statements as follows:

- (1) Significant correlations between the various 'field-dependence' tests were found amongst both male and female 9-year-olds, and amongst Chinese Literature students, but not amongst Mathematics and Physics students;
- (2) The correlation between the EFT and intelligence was much higher than that between the EFT and the RFT in the University samples;

- (3) Very little evidence was found in favour of the view that familiarity with Chinese characters might enhance performance on the EFT, in either sample;
- (4) Both samples proved more 'field-independent' than their American counterparts;
- (5) Little evidence was found of any effects of socialisation experiences on 'field-dependence' scores.

These, I think, are the important net results of this research. Let us look at them in more detail in the light of the two theoretical positions just described.

3. Criticism of Witkin.

In general, amongst some of the results above, Witkin's theory has met with a moderate degree of success. I want to suggest, however, that in several important respects it has failed to deal adequately with the evidence. This failure emerges first of all on a purely descriptive level.

(a) on the descriptive level.

Though the EFT-RFT correlations amongst the 9-year-olds and Arts students are in line with "psychological differentiation" theory, the figure of 0.095 for this correlation in the Science student group is discrepant with it. This result was obtained with a group of Ss whose abilities would be regarded by psychologists as relatively easily delineated; whose spatial ability was high; and who might be expected to produce clear supporting evidence for Witkin's theory. Yet in the event the EFT and the RFT have broken away from each other, and the 'field-dependence' dimension has failed to appear in one of the places where Witkin would have anticipated finding it.

In addition, while the EFT is significantly correlated with other tests of the battery, the RFT shows no evidence of any strong relationship to any other test amongst these science Ss. The two 'field-dependence' tests seem, at any rate in these very intelligent adults, to be measuring abilities which are distinct from each other.

Though the results obtained with the C/L Ss do not support my theoretical position, I would argue that they do not give very clear support to Witkin's either. The EFT-RFT correlation is high and significant, but the EFT-WAIS correlation is even higher: the same pattern, basically, as that found amongst the M/P Ss.

In other words, the theory of Witkin et al. (1962) has failed to provide a consistent DESCRIPTION of individual differences on its two fundamental measuring instruments. The idea at the centre of this theory, namely that individuals vary along a unitary dimension labelled "global-articulated" or "less differentiated-more differentiated" does not seem tenable in the light of these findings. Individual differences, even on a relatively simple task like the EFT, may be governed by many factors, hardly capable of being described by a single dimension of 'cognitive style'. The alternative to recognition of this fact is what Wallach (1962) has called "...a kind of 'imperialism' which leads one to view all phenomena as exemplars of a single conceptual dichotomy" (P.209). I agree with Wallach that theories such as Witkin's ought to be moving towards greater specificity of meaning, rather than towards greater generality.

Remaining on a purely descriptive level, once the idea of a single dimension or distribution has been discarded, a wide range of alternatives present themselves. It may be, for instance, that there is a 'cognitive

style' called 'field-dependence', but none called 'field-independence', since the latter involves different degrees of cognitive development in different directions. This might be a particularly apt way of thinking about cross-cultural differences.

In any case, both 'field-dependent' and 'field-independent' performances may be functions of other factors which have not been investigated by Witkin. Errors in the tests may be made, for example, because of test anxiety (Ruebush, 1960; Oltman, 1964) or of failure to understand the instructions (Lester, 1968, 1971). On the other hand, a 'field-independent' score may be obtained by "...minimally scanning the RFT configuration" (Silverman and King, 1970, P.124) and producing a low-error score without necessarily having employed an "analytic" attitude. So Witkin's account may be failing to describe the actual processes involved in achieving a particular RFT or EFT score.

The criticism, then, seems a valid one: individual differences in EFT and RFT scores may not fit a unitary pattern which can be described by one "personality" dimension.

(b) on the "causal" level

Based on the results of Chapters 3 and 4, I would criticise Witkin's formulation on a "causal" level also. Its proposal, that the principal "causal" variable responsible for the determination of EFT and RFT scores must be socialisation, receives very little support from the Hong Kong data. Findings amongst the 9-year-olds on occasion approach significance, and there are one or two clear-cut effects amongst the questionnaire results with the University sample, neither of which, however, applies to a prediction to which the theory would give priority. The tendency is for little evidence of a convincing kind to appear.

It seems reasonable to ask, in any case, how one would formulate the relationship between socialisation and a perceptual-cognitive "dimension" which is itself fragmentary and unstable. Until the theory is on firm descriptive grounds it cannot be expected to deal with the question of the origin of individual differences in test scores.

Socialisation cannot, on the basis of the present results at least, be invoked as a reliable determinant of an individual's level of "perceptual differentiation". One primary difficulty may be the problem of relativism: as Kagan (1967) has pointed out, the meanings of words like "rejection" and "strictness" may not be interpreted in the same way by parent and psychologist, or by different parents, or by different cultures. The notion that families can be classified and compared with one another might be wholly misinterpreting the nature of mother-child interaction.

Even if this difficulty were not present, it still remains true that a considerable amount of evidence points to the inadequacy of the 'socialisation' model of Witkin et al. (1962). It seems not only tenuous on a priori grounds, and stretched to cover too wide a range of variables; but also the methods used to research it, including the present ones, are of doubtful validity; and finally, when put to the (albeit limited) test, it did not produce much evidence of predictive reliability.

4. The alternative hypothetical position.

Several of the results of Chapters 3 and 4 are, I think, in accord with my own theoretical position concerning the roles of factors OTHER than socialisation in the determination of 'field-dependence' scores. Two main sets of results seem to support this position.

(a) The role of intelligence.

At nearly every stage of Investigation I, fairly consistent relationships were found between the EFT, RFT, and measures of general intelligence, and the possibility was raised that high EFT-RFT correlations might be a product of a common relationship to 'g'. In addition to the discovery of the instability of the 'field-dependence-independence' dimension, the results of Investigation II also supplied considerable backing for the suggestion that intelligence may be a key factor in influencing performance on the EFT. Looking back at Table 17 (P.136), one can see that the EFT is much more closely related to WAIS scores than to RFT error scores, both amongst the Science and the Arts faculty groups. Even when a significant EFT-RFT correlation exists, as with the C/L sample, the EFT-WAIS correlation is impressively higher. For the C/L group, to recap, the RFT is significantly (but not strikingly) related to WAIS and Matrices scores; while for the M/P group it is related to neither of these.

For both groups in the University sample, the EFT certainly seems to vary much more closely with intelligence than with any underlying personality dimension which "cuts across the boundaries of perceptual and intellectual functioning". Rather it is WAIS performance which seems to interact with the patterns of EFT and RFT performance.

Thus the role of 'g' in EFT score, far from being of secondary importance, may well have played a dominant part in influencing an S's performance: probably not only in terms of ability itself but also in increased awareness of, and reaction to, the test situation. The direction of influence cannot be established by correlations alone, of course (Cf. section 5(d) below); but it is certainly the case that the EFT is tied more closely to 'g'-tests than to the RFT.

In the absence of any convincing evidence of the impact of socialisation on EFT scores, and in the context of the findings of Berry (1966) (Cf. Chapter 1, Pp. 42-43), it is surely more plausible to argue that intelligence must be a PRINCIPAL component of the ability to find embedded figures. Looking at all the evidence, this seems to me a more viable position than that which maintains that socialisation is the fundamental variable.

(b) The role of education.

An additional set of factors whose effects may be superimposed on those of intelligence are those involved in the process of education. This is clearly a cluster of factors rather than a single one. The most likely channels through which I would expect education to influence EFT and RFT scores would be the following: by increasing S's motivation to succeed; by providing visual stimulation which will boost S's performance on analytical tasks, and provide him with 'strategies'; and by influencing his approach to task situations - facilitating control of his own activity, his relations with E, his degree of self-possession, and so on.

A number of the effects of education can certainly be detected in Investigation II. First, the performance of these Ss (and of those in sample 1) is superior to that of a roughly comparable American sample (Cf. Table 7, P.107, and Table 16, P.133). While both American and Chinese 'college' groups are at roughly the same levels of their respective educational systems, the fact that the Chinese sample performed more efficiently may be a reflection of the higher premium placed on succeeding on tests (and in school generally) in Hong Kong. This is a result associated with the relative 'scarcity' of education. These Ss who have

succeeded in getting to Hong Kong University are likely to be very well practiced in the art of taking tests.

Second, the fact that the W/P group proved superior to the C/L group on EFT and RFT performance may be a reflection not only of higher spatial or intellectual ability, but also of their ability to deal with 'problem-solving' test situations. The examinations which the Ss of the Science group have had to face may have nurtured in them an approach, problem-solving 'set', or capacity for intellectual 'distancing', which greatly improves all test performances, especially where these involve a time-limit. This may explain why their EFT performances are even more 'field-independent' (compared to the Arts group) than their RFT performances.

Third, it was found in investigation II that level of parental education had some marked effect on Ss' EFT score. In the face of the apparent absence of 'socialisation' effects in this sample, it seems likely that Ss may have been influenced here by the nature of their home environment in some other respects, as suggested by Vernon (1969).

Thus, the available evidence on this question does support the hypothetical position, that the educational environment of an individual plays an important part in influencing his performance on 'field-dependence' tests.

(c) A possible synthesis of the two hypothetical positions.

Concerning the cross-cultural evidence, then, it seems to me that these two important factors, intelligence and education, MUST be accommodated in any theory concerning the origin of individual differences in 'field-dependence' scores. It might, however, be possible to combine these factors with some aspects of the hypothetical position of Witkin et al. (1962) to produce a more comprehensive, if less simple, theory about 'field-dependence-independence'.

The crux of this argument rests on the increasing role played by intelligence in the genesis of EFT scores throughout individual development. As Busch and deRidder (1971) discovered, it is not necessary to control for intelligence in studies of 'field-dependence' with Ss between the ages of 4 and 6 years; in my own 9-year-old groups and Ss of approximately that age in the samples of Witkin, Goodenough, and Karp (1967), high EFT-RFT correlations were still found (though significant EFT-Matrices correlations were also in evidence); whereas in a cross-cultural study such as Berry's (1966), his Temne and Eakimo differed both in EFT and Matrices scores, a probable effect of 'g'; and finally, in the present study, with a highly intelligent University sample, EFT-RFT correlations have broken down and the most significant positive correlations are between the EFT and the WAIS.

Taken together, these facts suggest the following: that whatever the effects of socialisation, as development proceeds intelligence becomes a much more important determinant of EFT score than any other single factor. Also, the higher the intelligence level of the group, the more clearly will this relationship emerge. Further, As Ss get older, EFT and RFT scores become less and less related to each other; each acts more as a function of particular skills developed during the course of education (in the broadest sense of that word). Indeed, if the Wernierian (1948) orthogenetic principle is taken in its fullest sense, this is exactly what we would expect: that 'differentiation' in one sphere might not necessarily involve 'differentiation' in another. This account is much more flexible than that of Witkin (1967) for dealing with the cross-cultural evidence; it leaves open the possibility that different sets of factors may play special parts in 'fostering differentiation' of different

kinds; educational factors in one culture, ecological in another, motivational in a third.

Concerning the RFT, it is much less obvious what the factors are which underlie performance. Special training will probably play a part (Gruen, 1955; Weber, 1967); but intelligence is probably not related in any stable way to scores. Thus I would think it unlikely that the dimension of 'field-dependence-independence' has any real meaning cross-culturally; and ought really to be excluded from Vernon's (1969) scheme for describing different societies according to the mode of intellectual functioning they typically employ.

This rather simple account assumes that some of the difficulties inherent in the presentation of tests like the EFT and the RFT can be overcome. Particularly, it implies that a proper understanding is required of changes in EFT and RFT performance due to practice or extraneous factors. For instance, though as Goldstein and Chance (1965) demonstrate, sex-related differences in performance on the EFT disappear after a large number of trials, and performance is unstable, the question still remains as to why males and females do perform differently during the initial sets of trials. Once problems like this are more fully understood, the EFT may still be useful in cross-cultural research, provided its form is modified (Cf. Siann, 1972); and with the proviso that the whole pattern of performance over a long sequence of trials is described in full.

A few other possible ideas for dealing with some of Witkin's findings are dealt with below; in view of their tentative nature, I would think it is more appropriate to describe them under the heading of "suggestions for future research".

5. Criticism of the present study

In the light of the failings of the present study, which are numerous, if I were to carry out this or a similar project again many changes would be made. In this section they are outlined, together with the most obvious errors made in the present research, and their implications for the findings.

(a) Limitations of the samples.

Naturally it would be best if one could conduct research of this kind on a world-wide basis with trained research teams working with large, carefully matched and fully documented samples of Ss. Such a prospect is obviously unlikely; however, in the present study a number of improvements could certainly have been made. The Chinese-speaking 9-year-old sample should have been larger, for instance, but was restricted due to the limited amount of funds available for an interpreter. More serious, the Ns of 20 and 14 respectively in the two University groups were rather small; but since only second-year students from the two classes chosen were really suited to the demands of the research, and only the above numbers agreed to cooperate, it is difficult to see what alterations could have been made in the situation. Had the scope of my research been greater, a large number of other students might have been tested; but simply to administer tests for their own sake, without the guidance of research hypotheses, seemed rather arbitrary and illogical as a procedure.

One weakness of the University samples which was also unavoidable was the fact that the M/P group had significantly higher IQ scores than the C/L group ($t=2.76$, $p<.01$). In a sense the groups are not therefore strictly comparable, and their relative levels of performance on the EFT

cannot be wholly disentangled from the effects of intelligence. This means that Specific Hypothesis 4 of Chapter 4, concerning the groups' relative EFT and RFT scores, could not really be clearly tested. For most purposes, however, I was interested in factors operating within the groups rather than between them. It is unlikely that an Arts and a Science group can be properly matched on an IQ test in any case, and still be representative of their respective groups, as Hudson's (1966) work indicates: the type of test at which the members of each group excel is different, and Science students are typically better on tests of 'convergent' thinking, of which the WAIS is an example. This assumes, of course, that similar types of inter-faculty differences occur in Hong Kong as those which occur in Britain: a likely prospect, in view of the similarities between the educational systems (particularly the curricula) of each.

(b) Socialisation: Confucian?

Perhaps the major weakness of the present thesis stems from the problem of whether or not the socialisation practices now prevalent in Hong Kong are really significantly different from those now prevalent in the United States or Great Britain. Was this study really carried out in a society which, if we momentarily accept Within's ideas, "inhibited differentiation"?

A number of points may be raised in response to this. First, it is certain, as Wong (1970) indicates, that the past twenty years or so have seen a considerable degree of Westernisation take place in Hong Kong. The society is caught between two sets of mores: the 'traditional' and the 'Western' or 'modern'. These who came to Hong Kong from mainland China, and who place a high premium on the education of their children, are

less likely to have been Chinese 'traditionals' in the first place; and two decades of industrialisation and social change which have taken place since then are likely to have had a considerable impact on them. Thus, Witkin might argue, the very 'field-independent' EFT and RFT scores of these Ss might really be due to child-rearing practices "fostering differentiation".

Beside this, however, we must note that in terms of child-rearing amongst the present sample, we must really discuss what was prevalent in two periods 1961-64 (for the school sample) and approximately 1950 (for the students). Now it is widely agreed that the most rapid steps towards Westernisation have come to Hong Kong since 1960; and have been accelerating in their impact only since then. Though a British Crown Colony since the last century, Hong Kong was in the 1950's still markedly Chinese in character. It seems unlikely, therefore, that 'Westernisation' of child-rearing practices could explain the large differences between the present sample and their American counterparts.

The proper way to look at this question would of course be to obtain comparative information on child-rearing in the two cultures; no such information exists at present. Certainly the ratings which Ss gave their family experiences in the present study rarely mentioned harsh discipline, extreme strictness or authoritarianism, though a proportion of the 9-year-olds had slept together with their parents for long periods of time; but the interpretation of this evidence is open to the problems of relativism. Only a study like that of Caudill and Weinstein (1969) would help to answer these questions today.

It is, however, unlikely that the traditional 'Confucian' type of family life exists in any form in China or Hong Kong today, though traces

of it may survive in Taiwan. Nevertheless the findings of the present study still stand: convincing evidence of a relationship between 'socialisation' and 'field-dependence' scores is hard to find; and even if the Ss had been subjected to thoroughly American child-rearing experiences this would hardly explain, were the 'socialisation' hypothesis true, their extremely 'field-independent' patterns of scoring.

(c) The failings of questionnaires

The problems surrounding the unreliability of questionnaire methods, particularly when administered to parents about their methods of treating their children, have already been discussed in Chapter 1 (Pp. 21-23). Were I to conduct further research on child-rearing, I would try to avoid the use of questionnaires for either parents or their children. It seems to me that observational research, like that of Caudill and Weinstein (1969) provides a much more reliable source of information. This too, however, is not without its difficulties: merely being observed must change a mother's behaviour considerably; and in any case, as Kagan (1967) asks: how can it be decided whether a particular act of a parent is regarded in a particular way by a child? To quote Kagan: "...different theoretical words are necessary for the following three classes of phenomena: (a) an attitude on the part of the parent; (b) the quality and frequency of acts of parental care and social stimulation directed toward the infant, and (c) a child's assessment of his value in the eyes of another. All these classes are currently viewed as of the same cloth" (1967, P.133).

For the purposes of the present study, however, I thought that an effective test of Witkin's theory could be made using methods similar to his own; and really thorough investigations of 'socialisation' were not

possible in any case. The main drawback of the present methods, Witkin might argue, are that it is unlikely that the theory's predictions, even if valid, will emerge with small Ns in the criterion groups; particularly when the net result of carrying out a large number of statistical tests means that different sets of individuals are being included each time. I would agree with these criticisms. Yet the procedures involved here are scarcely less reliable than those of Berry (1966), which have nevertheless met with Witkin's approval. A glance at Berry's (1966) paper will show that in a number of cases, the sizes of his criterion groups were extremely discrepant: in one instance 4 Ss are compared with 86. Surely the fact that the four 'fairly strict' Ss differed significantly in EFT score from the 86 'not so strict' cannot really be taken as particularly robust evidence in favour of the 'socialisation' hypothesis.

I would maintain, therefore, that despite the methodological drawbacks involved, the Witkin 'socialisation' hypothesis has been given a reasonable test on its own terms in the present study, and that the absence of supporting evidence is due to inadequacies in the theory rather than in the methods employed.

(d) The problem of 'direction' in the relationship between intelligence and 'field-dependence'.

A weakness of this and of all studies on 'field-dependence' which attempt to examine its relationship to 'g' is the problem of interpretation of test intercorrelations. For although 'intelligence' is a concept of greater generality, and has been more thoroughly researched, it is not obvious that it is the more 'basic' of the two variables, in any deterministic sense. Even if correlation in this case did imply some 'causal'

link, the problem would still remain of which was the direction of causation, and whether it operated in a direct or indirect way.

Thus we are beset with the problem of deciding which, if any, of the two variables (in this case EFT and WAIS scores) is the more fundamental, the 'etiologically significant'. The standard psychometric approach would of course assume it to be intelligence; while Witkin et al. (1962) would regard 'field-dependence' as cutting across the standard categories of mental testing. In my own view, faced with the present findings of a high EFT-WAIS correlation in the absence of a stable EFT-RFT relationship, it seems that the first of these interpretations is the more acceptable: intelligence seems to play the dominant role. This is consonant with the view that the influence of intelligence on 'field-dependence' scores increases during development, as discussed in section 2 (c) of this chapter. The probable routes through which intelligence has this impact on EFT performance may be several in number: for example, through a process of intellectual 'distancing' by which S consciously adopts a more analytical, problem-solving approach to the situation; the more efficient development of strategies of systematic search; and perhaps also via greater capacities in short-term memory.

(c) failure adequately to test the "Chinese language hypothesis".

The most regrettable failing of the present study was the lack of any demonstration of the predicted enhancing effects of reading Chinese on EFT performance. This was probably, on reflection, due simply to the fact that no such 'transfer' effects exist; but it may be, on the other hand, that the hypothesis was not adequately tested. In both samples, effects were predicted: with the 9-year-old Ss, that the EFT would

correlate more highly with Chinese Language scores than with the RFT; and with the University Ss, that the differences between the M/P and C/L groups would be much less marked on the EFT than on the RFT. Neither of these hypotheses was in any way supported.

Failure to test the hypothesis with sample 1 was due primarily to the fact, discussed in Chapter 3 (Pp. 110-111), that the Chinese Test didn't really act as a measure of Ss' ability to deal with written Chinese. It was a test of the conceptual aspects of language functioning; a pure reading test would have been a much more useful tool. But it now seems unlikely, even had such a test been used, that it would have correlated highly with the EFT: the basic idea of transfer from reading Chinese characters to finding embedded figures is rather too large a stretch of the imagination. Further, it is doubtful, despite what Chinese etymologists say, that the reading of ideograms really does involve any process analogous to 'dis-embedding'; and even if a high correlation had been found, it might have been due to the fact that more 'field-independent' Ss were better at reading Chinese, rather than vice-versa.

With sample 2, again no effect could really have been expected since the M/P group were higher in both general intelligence and spatial scores than the C/L group. Even were a small effect there, it could scarcely be expected to show in the face of such marked group differences; and since the patterns of test intercorrelations in the two groups are somewhat different, it is likely that different processes are at work in each.

6. Suggestions for future research

Bearing in mind both (1) the inadequacy of Witkin's theory, and (2) the failings of the present study, an attempt will now be made to outline what I think are the most promising points which future research might illuminate.

(a) In the laboratory

A number of the assumptions of the Witkin school must be dropped from the outset, and rephrased in the form of questions: concerning the stability of EFT and RFT performances and the relationship between them; concerning sex differences; concerning the degree to which performance on 'field-dependence' tests can be said to relate to any enduring aspects of personality; and concerning the possibility that, at different age-levels, all these factors may operate differently: there may not be any value in assuming processes of regular growth in cognitive development.

Before research proceeds, therefore, the basic tests ought to be examined more thoroughly, over a wide range of age-levels, for both sexes; with Es of the same and opposite sex; and for longer testing sessions than used hitherto. Close attention should be paid to the effects of instructions (Lester, 1971), of noise (Oltman, 1964), of the type of materials used (Fitzgibbons and Goldberger, 1971) and of the change of performance with practice (Goldstein and Chance, 1965). A more thorough understanding of these tests might thus be gained.

One area which ought certainly to be investigated is that of arousal and anxiety. It is probable that, to some extent, emotional arousal even of a very mild variety influences the processes of selective attention (Easterbrook, 1959); and it has been argued that anxiety, far more than intelligence, is a crucial element in performance on tests of many different kinds (Cf. Wallach and Kogan, 1965, Pp. 192 ff.), those of 'field-dependence' included. Such research might help to resolve the problem of initial sex differences in test performance: whether a product of differences in physiological arousal (Broverman et al., 1968) or of sex-role and "cultural reward" processes (Vaught, 1965, 1971).

A second major area which requires investigation is that of Embedded Figures Test materials. It could well be, for instance, that an EFT involving geometrical shapes is easier for American male Ss not because of any underlying differences in "differentiation", but because of its relation to male-dominated areas of behaviour; and that the failure to find sex differences amongst the Eskimo (Berry, 1966; McArthur, 1967) was due simply to the fact that, in their culture, its sex bias (in materials and format) was eliminated. The 'field-dependence-independence' dimension, if it exists, may revolve not around degrees of "differentiation" but simply around differences in motivational orientation (Fitzgibbons and Goldberger, 1971), reflected in the types of materials to which Ss will attend in a task-like situation.

These are areas which can probably be most satisfactorily explored in the laboratory; further research in the cross-cultural field is inevitably much more complex.

(b) In the field

The most worrying prospect, given the considerations of the present thesis, is whether DIRECT cross-cultural comparisons with a test like the EFT really do tell us anything at present. Given the multiplicity of factors known to influence test performance, is it possible, even where we are faced with quite marked inter-cultural differences in patterns of scoring, to attribute these wholly or partly to the two or three 'independent' variables which our own research has highlighted? The differences that are obtained by manipulating the micro-cultures of the laboratory are sufficient to demonstrate that, when the larger differences that are found in the field emerge, they may be due to intelligence, or

education, or linguistic or ecological "training"; or even to socialisation, operating not via a process of "differentiation", but via the fluctuating processes of response to the test situation, perception of the task requirements, and reactions to the tester. I wholly reject the idea that because we can find differences between cultures in EFT score, and these cultures can also be shown to differ in their encouragement of independence, we have substantiated a theory about the development of the personality which seemed to be valid for selected groups in the U.S.A.

Given these difficulties, it seems to me that the most fruitful lines for cross-cultural study of 'field-dependence' lie in investigations of the patterns of relationships between the EFT, and RFT, and other tests within particular cultures. In conducting such research, both tests should be used; and they should form part of a larger battery employing, where possible, local equivalents of each test. Where possible, too, local testers ought to be trained: socialisation processes, whether or not they 'inhibit' or 'foster' psychological growth, must certainly influence reactions to an alien tester. The background of subject groups, both social and educational, should be investigated in as much detail as possible. I would advocate, in fact, observational studies of mother-child interaction, supplemented, if possible, by longitudinal follow-up studies, using perceptual and other tests, of the children in question. The basic problem, of course, lies in finding groups of Ss amongst whom, when a given pattern of performance appears, we can pinpoint the specific "cultural aids" which gave rise to it. Thus we might try testing, for example, a highly educated Tennesse group. "Field-independence" may be the product of many things. It is unfortunate, that in the complexity of human cultures, the controlled experiment is extremely elusive.

APPENDICES

APPENDIX 1(a): Test Scores for the 9-year-old sample.

Boys: N=33.

Subject No.	Age in Years & Months	WISC (Scaled)	Matrices	RFT Total Error (°)	RFT: Total Time (min)	CEFT	Kohs	Chinese
1	9-2	75	44	51	17.36	21	29	
2	9-6	74	44	15	9.05	24	29	
3	9-8	73	39	15	8.26	24	34	123
4	9-7	72	47	48	11.46	23	28	127
5	9-5	68	39	18	16.9	21	33	111
6	9-7	68	32	35	17.2	19	29	
7	9-9	66	29	187	19.63	19	24	13-
8	9-3	65	44	48.5	18.61	22	25	
9	9-7	65	41	105	28.08	19	24	117
10	9-3	62	39	44.5	10.93	19	33	
11	9-1	62	43	14.5	11.35	21	29	129
12	9-4	60	53	74.5	16.13	20	35	134
13	9-3	59	36	11	7.08	18	41	107
14	9-5	58	44	102.5	22.87	21	24	116
15	9-4	58	40	21.5	13.8	19	24	
16	9-6	58	51	27.5	8.28	23	41	
17	9-5	57	29	106.5	22.31	18	25	
18	9-5	57	22	84.5	9.86	15	24	
19	9-6	57	34	71.5	24.26	21	24	
20	9-8	57	36	19.5	11.73	23	39	113
21	9-3	57	40	10.5	16.55	20	32	110
22	9-5	57	43	111	22.16	20	33	129
23	9-4	56	22	50	20.33	18	24	110
24	9-0	55	38	14.5	16.83	18	28	110
25	9-8	55	29	20.5	19.16	23	30	127
26	9-2	53	22	100.5	28.5	19	8	116
27	9-10	53	45	14.5	18.28	22	28	125
28	9-4	52	24	17	15.1	22	26	
29	9-6	50	45	25	4.68	23	35	129
30	9-3	50	28	160	23.33	16	20	
31	9-6	48	18	64.5	29.9	19	24	92
32	9-0	43	32	50	22.18	22	37	104
33	9-4	27	31	95	24.78	17	20	98

Girls: N=21.

Subject No.	Age in Years & Months	WISC (Scaled)	Matrices	RFT Total Error (°)	RFT: Total Time (min)	CKFT	Kohs	Chinese
34	9-1	77	33	29	13.26	24	32	
35	9-6	66	45	14	8.33	25	42	125
36	9-5	64	47	21	22.83	22	30	129
37	9-1	64	50	17	14.16	21	25	131
38	9-3	62	41	11.5	13.65	24	30	123
39	9-1	61	46	19.5	10.35	23	44	127
40	9-5	59	41	61.5	9.0	22	29	121
41	9-10	59	36	77	23.88	18	20	123
42	9-3	59	25	176	33.93	16	12	117
43	9-7	57	44	165.5	22.4	20	20	
44	9-4	55	33	63	14.33	23	36	110
45	9-7	53	43	114	26.95	23	28	108
46	9-6	52	32	107.5	27.08	17	20	117
47	9-4	49	35	80.5	17.11	18	36	110
48	9-6	48	40	118	16.28	23	33	125
49	9-6	46	40	26	28.61	19	17	129
50	9-7	46	35	55.5	18.75	23	16	117
51	9-4	45	28	114	27.96	21	16	123
52	9-4	42	49	20	5.83	25	32	117
53	9-1	38	19	124	23.81	18	18	114
54	9-9	35	37	156	18.9	23	25	114

APPENDIX 1(b): Test Scores for the University sample.

Physics/Mathematics: N=20.

Subject No.	Age in Years & Months	Verbal	WAIS: Performance	Full Scale	RFT Total Error (%)	RFT: Total Time (min)	Matrices
55	20-3	135	116	129	10	2.85	58
56	22-4	122	121	123	8	4.53	57
57	22-8	132	132	134	15	1.25	59
58	20-11	120	110	117	19	1.80	55
59	23-8	115	132	124	12	3.93	59
60	21-5	119	131	126	18.5	2.86	54
61	22-5	115	120	118	45	8.43	57
62	21-0	124	114	121	17.5	4.68	58
63	22-1	128	132	131	14	4.06	55
64	20-9	121	104	115	70.5	8.58	46
65	22-6	120	125	124	7	1.80	52
66	22-7	129	127	130	10	2.25	57
67	20-8	121	119	121	21	5.25	58
68	21-1	114	112	114	88.5	5.82	44
69	21-10	135	131	135	20	3.31	45
70	22-0	113	102	109	13.5	7.23	42
71	20-10	109	134	121	19.5	5.42	50
72	22-8	115	100	109	6	16.43	53
73	21-5	124	116	122	11.5	2.06	47
74	20-4	127	119	125	50.5	1.95	51

Chinese Literature: N=14.

Subject No.	Age in Years & Months	Verbal	WAIS: Performance	Full Scale	RFT Total Error (%)	RFT: Total Time (min)	Matrices
75-0	23-0	108	116	112	26	13.4	43
76	21-0	127	116	124	13	5.35	36
77	21-0	113	116	115	21	5.58	31
78	24-4	116	98	109	121.5	20.00	30
79	21-7	115	116	117	6	3.46	41
80	22-1	118	111	116	4.5	6.0	31
81	22-1	125	111	120	34.5	2.63	42
82	21-4	111	117	115	22	7.36	41
83	22-7	125	112	121	14.5	4.54	44
84	21-0	114	99	110	25	13.82	30
85	24-5	118	107	114	31.5	6.6	30
86	20-8	-	-	-	117	18.73	42
87	21-8	-	-	-	54.5	11.52	34
88	24-11	119	114	118	8.5	3.86	51

APPENDIX II(a): Modifications to the WISC.

The items of the WISC were modified as follows:

In the INFORMATION subtest:

Item 7: How many cents are there in a Hong Kong Dollar?

" 16: From which book is "(a well-known quotation from a famous Chinese novel)" taken?

" 17: What is celebrated on October 1st, or on October 10th? (National Days of Communist and Nationalist China respectively; the mark was given if the child got either one correct.)

" 18: What is a registered letter?

" 19: What is the height of the average Chinese man?

" 24: How far is it from Hong Kong to Shanghai?

" 25: Which day of the year is labour day?

In the COMPREHENSION subtest:

Item 9: Why is it good to put money in the bank?

In the SIMILARITIES subtest:

No actual changes were made in any of the items; but extra care was taken to ensure that each child clearly understood the nature of the task, in view of its rather 'Western' flavour. As it turned out, however, none of the Ss seemed to experience any difficulty due to the 'strangeness' of the test.

APPENDIX II(b): The Wechsler Adult Intelligence Scale.

The eleven subtests of the Intelligence Scale are as follows:

- (1) The Verbal Scale: Information: Like the Information subtest of the WISC, this is a series of 29 items concerning general knowledge, each scored 1 or 0 according to whether correct or incorrect as directed in the manual. This was the only subtest in which modifications were introduced, and these were minimal: Question 11 became "What is the height of the average Chinese?"; Question 17 "How far is it from Hong Kong to Shanghai?"; and Question 20 "What is the population of China?".
- (2) Comprehension: A test of the individual's understanding of the world around him, containing items such as "Why do we pay taxes?", 14 in all. Scored 2, 1, or 0 according to the level of understanding shown in the response.
- (3) Arithmetic: 14 items, each with a time limit, with bonus marks for rapid response.
- (4) Similarities: 13 items, designed to elicit information concerning S's understanding of the common properties of objects, and the degree of abstractness of his system of categories. Each item scored 2, 1, or 0.
- (5) Digit Span: Almost identical to that in the WISC.
- (6) Vocabulary: A 40-item test, each item scored 2, 1, or 0 according to the level of precision of the response.
- (7) Performance Scale: Digit Symbol: A perceptual-motor task in which S is asked to copy out into a series of boxes a number of symbols representing the digits 1-9. S's score is the number of boxes completed in 90".

- (8) Picture Completion: A series of 21 cards, each containing a line drawing in which some crucial part of an object is missing; S is asked to name it. Scored 1 or 0.
- (9) Block Designs: This is the Kohs Block Designs Test, described in Chapter 3 (Section 2(c)). Administered in this case, with the student, exactly as described in the manual.
- (10) Picture Arrangement: Here, S is presented with a series of cards, on each of which is a drawing representing part of a story; S is asked to order them in the appropriate way. There are 3 series in all; the test is timed, with speed bonuses on the last two series.
- (11) Object Assembly: In this test, S is presented with a series of flat wooden shapes, which when put together can be made into a familiar object. Scoring is based both on the total time taken to make the required and on the number of correctly juxtaposed parts.

APPENDIX III(a): Sample 1 Questionnaire.

This Questionnaire was sent to the parents of the children in Sample 1. It was translated into Chinese and back again into English by two different interpreters to produce the version below.

" Notice.

The following is concerned with an investigation of education in Hong Kong:-

Your child has received some educational and psychological tests. In order to understand them more fully, it is desirable to obtain more information concerning his/her role in the family and his/her relationship with you. I would be very grateful if you could answer the following questions in the attached form, and send it back through your child to the school within a week.

To the child's parents.

University of Hong Kong.

- (1) In the eyes of the parents, most children do some naughty things, therefore parents will often punish them. Do you use the same method, or different methods of punishment in all instances? Please state some of the methods you use, and the methods you would use under special conditions.
- (2) In your opinion, what is a harsh method of punishment?
- (3) When your child was still young, which of the above-mentioned methods did you adopt?
Did you use them-
 - (1) very often?
 - (2) often?
 - (3) sometimes?
 - (4) seldom?
 - (5) very seldom?
- (4) Have you ever adopted a method of threat, without putting it into practice afterwards?
- (5) Does the child know that some behaviour will certainly lead to punishment? And will he still go on with it when you are in a good mood?
- (6) If both you and your wife are present, who would normally execute the punishment?
- (7) In preparing for a celebration, does the child work most of the time with you, or with your wife?
- (8) How does he (or she) get along with his (or her) brothers and sisters?

- (9) Most children will have fights and rows with their brothers and sisters, or with their peers. Some parents think they should try to investigate the matter and arbitrate; others will pay no attention and let the children solve the matter among themselves.
What is the attitude you commonly adopt?
- (10) Some children like to do things by themselves and make their own decisions, others would like their parents to decide for them.
To which type does this child belong?
- (11) Some children will get angry with their parents or other elders, and would even argue back. Has your child ever done this?
(If YES) What do you do?
(If NO) And unfortunately it happens, what would you feel?
- (12) What is it about your child that pleases you most?
- (13) What is it about him (or her) that makes you angry, or displeases you particularly?
- (14) How does your child behave if everything is arranged in perfect order?
- (15) Some children like to do things well, and if the result is not satisfactory, they will feel unhappy. Others are careless and would feel indifferant even if something went wrong. How does this child behave in this respect?
- (16) What is the thing you most expect your child to succeed in?
(e.g. school work, dancing, physical education, etc.)
- (17) In your opinion, in what grades should your child's results in school be classified? Would C grade or B grade be alright?
- (18) Is it necessary for you to remind your child from time to time about the things he is working on, and to encourage him to work hard?
- (19) When your child was young, did he (or she) sleep alone or with other people? If so, with whom? Did he sleep beside you? If so, for how long?
- (20) If his (or her) bed was kept in the same room as yours, how long did this last?"

The questions were, of course, so arranged as to leave room for written answers after each. The responses were translated back into English by another interpreter.

APPENDIX III(b). Sample II Questionnaire.

"Name	Date of Birth
University Course	A-levels and grades
Estimated ability in Chinese	

How long have you been in Hong Kong?

How many years of schooling have you had?

How many brothers and sisters have you?

When a child, were you cared for by your parents or by someone else?

What is the highest standard of education reached by your father?

What is the highest standard of education reached by your mother?

In which of the following categories would you place your father's occupation?

- (1) unskilled manual
- (2) semi-skilled manual
- (3) skilled manual
- (4) lower clerical
- (5) lower professional
- (6) upper professional

In which of the following categories does your family's income lie?

(H.K.\$ per month)

- (1) below 300
- (2) 300-600
- (3) 600-900
- (4) 900-1200
- (5) above 1200

The following questions consist of scales on which you are asked to rate yourself according to the degree to which something is true or untrue of you; the two ends of each scale represent opposite extremes with regard to the variable in question.

Do you think your parents have high or low aspirations for your future?

LOW — — — — — — HIGH

Would you say that your home is a very stimulating one (are there books, etc.)?

VERY DULL — — — — — — VERY STIMULATING

Some parents are very protective, and won't allow their children to make decisions for themselves; others are very encouraging, and want their children to be as independent as possible. What do you think is more true of yours?

VERY PROTECTIVE _____ VERY ENCOURAGING

Who makes most of the decisions in your family, your mother or your father?

When you were young, were you ever naughty?

When you were naughty, did your parents punish you?

Did they use a variety of methods or always the same method?

How often were they likely to punish you?

- (1) very often
- (2) often
- (3) sometimes
- (4) seldom
- (5) very seldom

Did they often make threats and then not follow through?

Would you say that their methods of treating you were very severe or very permissive?

PERMISSIVE _____ SEVERE

Who was mainly responsible for punishing you, your mother or your father?

When doing things for pleasure, did you spend more time with your mother or with your father?

Most children will fight with their brothers and sisters or with other children. When you did so, did your parents usually stop you or allow you to continue?

Would you say that you are a more independent, or a less independent kind of person?

MORE INDEPENDENT _____ LESS INDEPENDENT

When you were young, did you ever talk back to your parents?

Do you tend to be an easy-going, carefree sort of person, or are you more inclined to worry and feel a sense of urgency about things?

EASY-GOING _____ WORRIED

Are your parents eager for you to be successful?

Do you think they are satisfied with your progress?

Do they ever remind you that you should do well or better than you are doing?

- (1) very often
- (2) often
- (3) sometimes
- (4) seldom
- (5) very seldom

Would you say that your father is very strict or not at all strict?

VERY STRICT _____ NOT AT ALL STRICT

Would you say that your mother is very strict or not at all strict?

VERY STRICT _____ NOT AT ALL STRICT

Do you usually make up your mind for yourself about things?

ALWAYS _____ NEVER"

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