1. The holistic/analytic cognitive style and second language learning strategies

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Abstract
With the development of more learner-centred approaches to language learning, researchers into second language acquisition (SLA) have, over the past twenty years or so, begun to take a serious interest in cognitive styles. The main aim of the study described in this article is to assess the relevance of Riding's holistic/analytic cognitive style continuum to SLA research in order to establish whether it might serve as a better alternative to the more traditional field dependence/independence (FD/I) construct. The relationship between second language learners' cognitive styles and their language learning strategy preferences is examined with reference to both individuals and to cross-cultural and gender-based differences.

1. Introduction
1.1 Cognitive styles and language learning strategies

The term "cognitive style" refers to an individual's characteristic and consistent approach to organising information (Schmeck 1988). Miller (1987) goes into a little more detail, claiming that a person's cognitive style refers to the way in which he/she habitually perceives, retrieves and processes information. Schmeck (op. cit.) applies this to the learning process when he says that a person's cognitive style determines how he/she perceives a task, how he/she then goes about completing it, and limits, to some extent, his/her ability to complete it. Cognitive styles are usually referred to in terms of continua (Skehan, 1998), and have been found to be a relatively stable cognitive trait (for example Das, 1988; Kagan, 1980; Kogan, 1983; Pask, 1988).

With the development of more learner-centred approaches to language learning, researchers into second language acquisition (SLA) have, over the past twenty years or so, begun to take a serious interest in cognitive styles. Willing (1988, pp. 1 and 59) argues that cognitive style, along with other factors such as upbringing, socio-cultural background and previous educational experiences, helps determine a student's learning style (the approach which is taken consistently to learning) and
that this in turn helps determine the learning strategies chosen by that student.

These strategies are defined by Oxford (1993, p. 175) as

Specific actions, behaviours, steps or techniques that students employ – often consciously – to improve their own progress in internalising, storing, retrieving, and using the second language.

Later in this article, a study is described which examines the relationship between second language learners’ cognitive styles and their language learning strategy preferences. This is somewhat controversial as some researchers cast doubt over the idea that cognitive style can determine learning style and that this in turn can affect strategy preferences. For example, Little and Singleton (1987) argue that it is important to distinguish between cognitive style, which is largely unconscious, and the approach to the learning task, which is largely conscious. However, Bialystok (1985, p. 256) contends that strategies do not always have to be conscious:

Although the term strategy is usually restricted to those activities applied with some intentionality, those conscious strategies are no different from the other processes of learning which, for one reason or another, have not achieved conscious status for the learner or the teacher.

One could conclude from this that relationships between (subconscious) cognitive styles and (largely conscious) language learning strategies are to be expected, but that they are likely to be complicated by the transition from subconscious to conscious thought. One of the aims of the study described in this article is to examine the way in which cognitive style interacts with language and gender to affect students’ preferred language learning activities.

1.2 Cognitive styles research in second language acquisition:

Field dependence/independence and Riding’s holistic/analytic continuum

The main aim of the study described in this article is to assess the relevance of Riding’s holistic/analytic cognitive style continuum to SLA research in order to establish whether it might serve as a better alternative to the more traditional field dependence/independence (FD/I) construct. Until the mid 1990s, cognitive styles
research in the context of SLA was heavily focused on FD/I (see, for example, Alptekin and Atakan, 1990; Chapelle, 1988; Ellis, 1989; Fuller-Carter, 1988). FD/I is usually measured by means of the Group Embedded Figures Test (GEFT), in which the participant must disembed a single item from a larger context. FI individuals are thought to be better at this than FD individuals, but the latter are thought to perform better in social and interactional contexts (Witkin and Goodenough, 1977)². In SLA, it has generally been hypothesized that FI students will be better at aspects of SLA that involve the study of grammar rules and vocabulary, whereas FD students will display superior interaction skills (see, for example Chapelle and Roberts, 1986). However, although some relationships have been found between FI and measures of L2 proficiency (see for example, Fuller-Carter, 1988; Hansen and Stansfield, 1981; Naiman et al., 1978), Skehan (1989) points out that when scholastic ability is partialled out, many of these relationships disappear. More importantly, no relationships have been found between FD and any aspect of language learning success.

This situation has led some researchers to question the usefulness of the FD/I construct in general (Griffiths and Sheen, 1992) and the GEFT in particular (Chapelle and Green, 1992). Chapelle and Green’s criticism of the GEFT is that it does not provide an adequate measure of the cognitive attributes of FD individuals. In the GEFT, the FI individual is able to find a simple figure embedded in a more complex one, and the FD individual is merely unable to complete the task. Chapelle and Green (1992) claim that this test is simply a measure of cognitive restructuring ability, and that it therefore measures intelligence rather than cognitive style. Littlemore (1998) and Skehan (1998) suggest that one solution to this problem might be for researchers to shift their focus away from FD/I onto Riding’s (1991) holistic/analytic cognitive style continuum. Riding proposes two fundamental cognitive style continua, holistic/analytic and verbaliser/imager. It has been claimed that the holistic/analytic continuum focuses on style of processing, whereas the verbaliser/imager continuum focuses on levels of representation (Skehan, 1998). The discussion in this article is limited to the holistic/analytic cognitive style as it may offer a better alternative to FD/I in SLA research. Holistic processing, in which parts are considered together as a whole, is contrasted with analytic processing, in which the whole is broken down into parts. It is similar to FD/I in that both constructs contrast a style of cognitive processing in which parts are considered together as a whole with a style in which the whole is broken down into parts.
However, what the holistic/analytic distinction offers that is not offered by the FD/I distinction is a cognitive element to the holistic/FD end of the continuum. Holistic processing involves drawing together pieces of information and treating them as a whole, perceiving similarity and togetherness, whereas analytic processing emphasises the perception of difference and separateness. Thus, unlike FD/I, the holistic/analytic cognitive style continuum can be said to be truly bi-polar. It will be seen below that, unlike the GEFT, the test used to measure the holistic/analytic continuum gives equal weighting to the holistic and analytic poles.

Another advantage of the holistic/analytic cognitive style continuum is that it can be measured objectively. The Cognitive Styles Analysis (CSA) which is used to measure the holistic/analytic continuum is described later in the article. Riding and Sadler-Smith (1992, p.327) claim that this instrument provides a “direct measure, assessing the fundamental underlying mechanisms which determine behaviour”. It is therefore likely to tap into subconscious processes that can only be inferred from questionnaire responses.

The importance of the holistic/analytic cognitive style continuum has already been recognized in fields outside SLA (see, for example, Miller, 1987; Riding and Cheema, 1991; Schmeck, 1988). The fact that these researchers appear to consider the holistic/analytic continuum to be an important cognitive style dimension, combined with the fact that it is a more balanced construct than FD/I, means that it might prove to be a significant predictor of individual differences in approaches to second language learning. In general educational contexts, individuals with a holistic cognitive style have been found to favour a process-oriented approach to learning, closed tasks, and group work, whereas analytic individuals favour the opposite learning approaches (Riding and Read, 1996). It is likely that similar findings would be made if the CSA were investigated in the context of language learning.

Research into cross-cultural differences in language learning strategy preferences suggests that there might be a relationship between the holistic/analytic learning style continuum and strategy preference. For example, Oxford and Anderson (1995) found that Hispanics use “holistic” strategies such as predicting, inferring, avoiding details and working with others. Anglo-Americans, on the other hand, have been found to use “analytic” learning strategies aimed at achieving
accuracy and precision (Stewart, 1972). One might also hypothesise that holistic students will try to draw broad comparisons between the target language and their native language, use the context to guess meanings of words, and avoid details. Analytics on the other hand, might focus on the differences between languages, work at the individual word level when reading, and use strategies that are aimed at achieving accuracy and precision.

If the holistic/analytic cognitive style continuum is to be used in SLA research, then it is necessary to consider its relationship with current developments in cognitive styles research in the field. In fact, both Ehrman (1996) and Willing (1988) have sought to deal with the inadequacies of the FD/I construct in SLA.

### 1.3 Ehrman's reconceptualisation of FD/I

Ehrman (1996) proposes an interesting reconceptualisation of the FD/I construct. She claims that the traditional notion of FD is in fact a combination of two traits; an absence of FI, and responsiveness to the surrounding background. According to Ehrman, these traits are independent, and should be treated separately. She thus suggests that FD/I be re-conceptualised as two dimensions, namely FD/I and field sensitivity/insensitivity (FS/N). Both these dimensions are ability dimensions. FD/I refers to a person’s ability to discriminate from the background, and FS/N refers to a person’s sensitivity to cues that are given in the context. The two dimensions are displayed in Figure 1.

<table>
<thead>
<tr>
<th>Field Independence</th>
<th>High</th>
<th>Low</th>
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<tr>
<td>High</td>
<td>Type 1</td>
<td>Type 2</td>
</tr>
<tr>
<td>Low</td>
<td>Type 3</td>
<td>Type 4</td>
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**Figure 1.** Ehrman's (1996) model of Field Independence and Field Sensitivity: two related dimensions.

According to Ehrman, the most successful learners are Type 1 learners, who can both discriminate what is important from the background, and use cues in the context. Type 2 learners are good at analyzing language but not so adept at using language in sociocultural settings. Type 3 learners gain cues from the environment...
but find it difficult to discriminate what is important. Type 4 learners are, according to Ehrman, usually the least successful learners as they are both unable to identify salient information, and are insensitive to contextual cues.

1.4 Willing's reconceptualisation of FD/I
Willing (1988), the other researcher to reconceptualise FD/I for the purposes of SLA research, investigated the preferred learning activities of migrant learners of English in Australia. He was able to identify two learning style dimensions, the concrete/analytical dimension, and the communicative/authority-oriented dimension. According to Willing, analytical learners show a preference for analysis and an interest in structure. They also value independence and autonomy in their language learning. Concrete learners, on the other hand, process information in a more 'hands-on' manner, preferring to learn inductively. According to Willing, the concrete/analytical dimension corresponds to the traditional notion of FD/I. As for the communicative/authority-oriented continuum, communicative learners have a 'people-oriented' approach to learning the language, looking for opportunities to practise, whereas authority-oriented learners tend to rely on the teacher's direction. He describes the communicative/authority-oriented continuum as an intersecting personality variable which subdivides both the FI and the FD groups.

Thus Ehrman and Willing both extend and elaborate on the original FD/I concept in different ways. One of the aims of the study reported in this article is to examine the relationships between Riding's model and each of these models in order to assess how Riding's model might be integrated into SLA research.

1.5 Possible relationships between Riding's and Ehrman's models
Within Ehrman's model, Riding's holistic/analytic cognitive style continuum could be related to either the FD/I dimension or FS/N dimension. The fact that the GEFT and the part of the CSA designed to measure analytic processing are virtually identical means that relationships between analytic processing and FI are extremely likely. This is supported by the fact that in general learning contexts analytic individuals have been found to be more open to individual work than holistic individuals (Riding and Read, 1996). One might therefore expect similar findings in language learning. According to Ehrman, both Type 1 and Type 2 learners are FI, the difference being that Type 1 learners make better use of context than Type 2 learners. Analytic learners may turn out to be Type 1 or Type 2 learners.
Learners with a holistic cognitive style, according to the CSA, have been found to benefit more than analytic learners from advance organisers, such as headings and sub-titles (Riding and Sadler-Smith, 1992). This suggests that they may be less able to impose their own structure on relatively unstructured input. They have also been found to prefer closed tasks to open-ended ones (Riding and Read, 1996). Both of these findings suggest that there are parallels between the holistic cognitive style and FD.

On the other hand, the fact that holistic individuals “tend to see the whole of a situation, and are able to have an overall perspective, and are able to appreciate the total context” (Riding and Sadler-Smith, 1992) suggests that they might also be FS. One might conclude from this that holistic learners correspond to Ehrman’s (FD/FS) Type 3 learners and that they might be expected to use strategies such as inference and guesswork.

The discovery of a relationship between Riding’s and Ehrman’s models would provide mutual validation for each of the models as well as giving an indication of the type of role that Riding’s model might play in future SLA research.

1.6 Possible relationships between the Riding and Willing models

For reasons outlined above, one would expect there to be certain parallels between Willing’s ‘concrete’ vs. ‘analytical’ dimension, and the holistic-analytic cognitive style continuum. The fact that holistic individuals have been found to favour concrete, task-based learning activities (Riding and Read, 1996) suggests that Riding’s holistic cognitive style and Willing’s concrete style might be related. If holistic students were found to favour language learning activities such as talking in pairs, watching videos and listening to cassettes, then this would suggest that there is a relationship between Riding’s holistic and Willing’s concrete styles.

One might also expect Riding’s analytic individuals to resemble Willing’s analytical learners. If such learners were found to favour language learning activities such as studying grammar, discovering their own mistakes and studying alone at home, then this would suggest that there is a relationship between Riding’s analytic and Willing’s analytical styles.

The holistic/analytic cognitive style might also be related to Willing’s communicative/
authority-oriented continuum. The fact that holistic individuals have been found to favour communicative learning activities suggests that Riding’s holistic cognitive style and Willing’s communicative learning style might be related. If holistic learners were found to favour language learning activities such as talking to friends in the target language, using the target language in real world contexts and participating in target language conversations in class, then this would suggest that there is a relationship between Riding’s holistic and Willing’s communicative styles. On the other hand, Tudor (1996) makes the point that analytical individuals may perceive a need to practise the language and will therefore be equally likely to employ these activities. The study described in this article therefore investigates this possibility.

Finally, the fact that holistic individuals have been found to exhibit an “authority-oriented” approach to language learning suggests that there may be a relationship between Riding’s holistic cognitive style and Willing’s authority-oriented learning style. If Riding’s holistic learners were found to favour activities such as having the teacher explain everything and taking careful notes in class then this would suggest that Riding’s holistic learners closely resemble Willing’s authority-oriented learners. One of the aims of the study described in this article is to investigate whether Riding’s holistic learners correspond more closely to Willing’s communicative learners or his authority-oriented learners.

Although there are likely to be strong relationships between Ehrman’s, Willing’s and Riding’s models, they are unlikely to map neatly onto each other. The aim of the research described in this article is thus to identify areas in which they overlap and areas in which they do not.

The discovery of a relationship between Riding’s and Willing’s models would provide mutual validation for each of the models as well as giving an indication of the type of role that Riding’s model might play in future SLA research.

1.7 Interactions between cognitive style, language being learned and gender on language learning strategy preferences

It is unlikely that the relationship between cognitive style and learning style and strategies is straightforward because of a number of different factors. These include situational variables such as the language being learned, task requirements
and stage of study, as well as learner variables, such as gender, motivation, aptitude and cultural background. The study described in this article looks at the interactions between cognitive style, one other learner variable (gender) and one situational variable (language being learned). These variables were chosen as they are both easy to measure and have wide implications.

A number of gender-based differences have been found in language learning strategy usage. For example, researchers have found that females report greater strategy use than males (Ehrman and Oxford, 1988; Reid, 1987), that females are more socially interactive than males in the L2 classroom (Ehrman and Oxford, 1988 and Oxford et al., 1988), that females use more “global” strategies, whereas males use more “local” strategies (Bacon and Finneman, 1990), and that men tend to use more cognitive, “bottom up” strategies, whereas women tend to use more metacognitive “top down” (Bacon, 1992). The study described in this article investigates the possibility that cognitive style and strategy preferences interact differently in men and women.

As for the language being learned, the closer the resemblance between the target language and the student’s native language, the easier it is for students to choose strategies based on comparison (see Chen 1990). Furthermore greater strategy use has been reported for languages that are generally perceived as difficult to learn (Chamot et al., 1987; Politzer, 1983). Oxford (1990) points out that there could be a population bias here as “difficult” languages are generally chosen by “highly motivated, strategy-wise students” (Oxford 1990, p.94). The study described in this article investigates the possibility that the relationship between the cognitive style and strategy preferences varies according to the language being studied.

2. The study
2.1 Research questions
The research questions in this study can be divided into two sets, both of which look at how the holistic/analytic cognitive style continuum might be integrated into SLA research. The first set of research questions concerns the relationship between Riding’s model and those proposed by Ehrman and Willing:

- Do Type 1, Type 2, Type 3 and Type 4 learners, as described by Ehrman, favour different types of language learning activities?
- Do analytical/concrete and authority-oriented/communicative
learners, as described by Willing, favour different types of language learning activities?

- Can these types of learners be identified by using the CSA?

The second set of research questions looks at the combined effects of cognitive style, gender and language on language learning strategy preferences:

- Is the holistic/analytic cognitive style related to language learning strategy preferences?
- How is the relationship between cognitive style and strategy preferences affected by the gender of the participants?
- How is the relationship between cognitive style and strategy preferences affected by the language being studied?
- How do gender and language of study combine to affect the relationship between cognitive style and language learning strategy preferences?

In order to investigate the above research questions, it was necessary to test both the cognitive style of the participants, and their language learning strategy preferences.

2.2 The participants
The participants were 81 first-year ab initio students of either Spanish (N=46) or Japanese (N=35) at a British university. They were all native speakers of English who were majoring in science and engineering subjects. 54 of the participants were male and 27 were female. Japanese and Spanish were considered to be good languages to compare as they are different in a number of ways. Firstly, unlike Spanish, Japanese has a different script from the students’ L1. Secondly, the students of Spanish are more likely than the students of Japanese to have opportunities to visit the country where the language is spoken. Thirdly, Japanese is often perceived to be a more difficult language to learn than Spanish.

2.3 Measuring the holistic/analytic cognitive style
In order to measure subjects’ holistic/analytic cognitive styles, Riding’s (1991) computer-based Cognitive Styles Analysis (CSA) was used. This is an objective, bi-polar, computer-based test of the holistic/analytic cognitive style continuum.
In the part of the CSA designed to measure “analytic” processing, participants must attempt to find a simple shape which is embedded in a more complex one. Two shapes are displayed side by side on the computer screen. The question

“Is shape ‘A’ contained within shape ‘B’?”

appears at the bottom of the screen. If the participant thinks that it is, then he or she must press a “correct” key, if not, then he or she must press an “incorrect” key. This procedure is repeated 20 times with different shapes, some of which are contained within each other, others of which are not. In theory, analytic participants should respond quickly to this part of the test, as they will automatically focus on the details (see, for example, Kirby, 1988).

In the part of the test designed to measure “holistic” processing, pairs of complex figures are to be judged “same or different”. Two images are presented side by side on the screen. This time the question

“Is shape ‘A’ identical to shape ‘B’?”

appears at the bottom of the screen. This procedure is repeated 20 times with different shapes, some of which are identical, others of which are not. Again, participants must press a “correct” key if he or she thinks the answer is yes or an “incorrect” key if the answer is no. In theory, holistic participants should respond quickly to this part of the test, as they will automatically focus on the whole picture.

In both parts of the test the computer records the reaction times of the subjects and produces these times in the form of a ratio as shown in Figure 2:

\[
X = \frac{\text{Reaction Time on Analytic Test}}{\text{Reaction Time on Holistic Test}}
\]

If \(X < 1\), it is assumed that the subject processes better analytically than holistically.

If \(X > 1\), it is assumed that the subject processes better holistically than analytically.

**Figure 2: CSA holistic/analytic ratio**
Both the content and the trait validity of the holistic/analytic part of the CSA have been well established (Douglas and Riding, 1993; Riding and Read, 1996).

This test was piloted on 43 English language students during a previous study. This piloting highlighted the need for the participants to be told clearly that their reactions were being timed. As the participants were only required to use two keys throughout the duration of the test, it was not felt necessary to give them any keyboard training.

The test was administered to six participants at a time. The participants were seated 1 metre apart and a high ratio of supervisors to subjects (1:3) was on hand. The subjects were encouraged to ask for assistance whenever it was required. None of the participants needed to ask for assistance. The results were calculated automatically by the programme in the way described above and communicated to the participants, on the screen, as soon as they had completed the test.

In order to carry out statistical analysis, the population was split into two groups according to whether their score fell above or below the mean for the group. This gave the following two groups:

- “holistics” (N=45)
- “analytics” (N=36)

Although this approach appears to be somewhat categorical, it was used to simplify the statistical procedures and closely follows the approach used by Riding and his co-workers (see, for example, Riding and Read, 1996).

2.4 Assessing language learning strategy preferences

In order to assess language learning strategy preferences, a 38-item questionnaire was administered to the participants (see Appendix A). All of the items in this questionnaire were language learning activities thought to be preferred by the four types of learners described by Ehrman and the four types of learners described by Willing. The participants were asked to indicate on a scale from 1 to 5, the extent to which they thought each activity would be helpful.
3. Findings

3.1 A preliminary finding
Before addressing the research questions themselves, mention should be made of a significant result that was not predicted in this study. This was that the students of Japanese were significantly more likely to have an analytic cognitive style (p = 0.05), while the students of Spanish were significantly more likely to have a holistic cognitive style (p = 0.05). This might reflect the popular conception that an analytic approach might be needed in order to understand the intricacies of the Japanese writing system (see, for example, O’Neill and Yanada, 1963, p. vii). This finding indicates that a person’s cognitive style may have a significant influence on their decision to study a given language. This suggests that certain languages have particular images that attract different types of people. The implication of this is that students who choose to study a particular language may come prepared to use a certain approach or set of strategies that they feel to be appropriate for the study of that particular language. The finding provides support for a relationship between cognitive style and learning strategy preferences. Let us now turn to the research questions themselves.

3.2 Findings concerning the first set of research questions
In order to answer the first two research questions, Do the four types of learners described by Ehrman favour different types of language learning activities? and Do the four types of learners described by Willing favour different types of language learning activities? a factor analysis was carried out on the participants’ responses to the questionnaire. It was hypothesized that the factors produced would correspond roughly to the categories proposed by Ehrman and Willing. In order to answer the third question, Can these types of learners be identified by using the CSA?, correlations were looked for between the factors produced and Riding’s holistic/analytic cognitive style dimension.

The method used for the factor analysis was Principal Components Analysis with a Varimax Rotation and Kaiser Normalization. The rotation converged in 35 iterations. Factor loadings of >0.4 were considered significant. Eleven factors emerged of which the first five were meaningful within the context of this study. These five factors explained 38% of the variance. The items that loaded on each of the five factors are presented below. Details of the exact loadings can be found in Appendix B.
Factor 1 accounted for 9.65% of the total variance. The language learning activities that loaded on this factor were
- Working systematically through a textbook
- Being left to find out my mistakes by myself
- Learning from examples
- Learning grammar rules
- Doing written exercises which involve filling in the correct forms of verbs in sentences
- Discovering grammar patterns for myself
- Learning lists of vocabulary

This could be described as an “attention to form” factor. It contains activities which are associated with different learning styles and therefore does not lend support to Ehrman’s and Willing’s models. However, it is interesting that an “attention to form” factor was the first to emerge as it lends support to the form/function dichotomy (see Swan, 1985).

Factor 2 accounted for 8% of the total variance. The language learning activities that loaded on this factor were
- Using the context to work out the meaning of unfamiliar words
- Seeing new words in context
- Watching videos in class
- Learning about the culture of the language

This could be described as a “use of context” factor. All the activities that loaded on this factor are associated with FS, one is also associated with a concrete learning style. It could also be contrasted with factor 1 in that it appears to describe “attention to meaning” rather than “attention to form”. Again, this lends support to the form/function dichotomy. It is also interesting that activities such as “working systematically through a textbook”, that might be associated with the more “dependent” side of FD did not load on this factor. The factor therefore appears to describe students who were able to use the context to support their learning, but who were not dependent on that context. This lends support to Ehrman’s model in which FS is independent from FD.

Factor 3 accounted for 7.06% of the total variance. The language learning
activities that loaded on this factor were
- Finding my own opportunities to speak the language outside the classroom
- Speaking the language in class
- Visiting a country where the language is spoken
- Watching videos and listening to the language at home

This could be described as a “communicative language learning activities” factor, and provides evidence of Willing’s “communicative” learning style. Willing’s model is further supported by the fact that many of the activities that loaded on this factor reflect an independent approach to language learning which, according to Willing is “certainly not incompatible with the defining questions of the ‘Communicative’ set” (1988, p. 159).

**Factor 4** accounted for 6.674% of the total variance. The language learning activities that loaded on this factor were
- Being left to find out my mistakes by myself
- Creating my own short term goals for language learning
- Creating my own long term goals for language learning
- Doing language drills in class
- Helping the teacher design the training programme

This could be described as a predominantly “independent learning” factor. It lends support to both Willing’s and Ehrman’s view of FI as a useful style construct. The fact that “doing language drills in class” also loads on this factor is surprising as one would expect this activity to be in complete contrast to the others. However, it will be seen below that there was a significant gender effect for this item. The implications of this are discussed below.

**Factor 5** accounted for 6.61 of the total variance. The language learning activities that loaded on this factor were
- Working systematically through a textbook
- Playing language learning games in class
- Doing pair work and group work in class
- Asking for help when I do not understand
- Doing written exercises which involve filling
This could be labelled as a “classroom-based activities” factor. It contains a mixture of communicative and authority-oriented activities. The contrast between factors 4 and 5 suggests that “preferred place of study” might be a factor worth adding to Ehrman’s and Willing’s models.

In order to investigate the third research question *Can these types of learners be identified by using the CSA?*, correlations and three-way ANOVAs were carried out on each of the factors, involving the holistic/analytic cognitive style, as measured by the CSA, gender and language of study. No significant relationships were found with any of the five factors. The lack of a relationship between the holistic/analytic cognitive style continuum and these factors may be due to weaknesses in the factor analysis itself. Each of the factors only explained a very low percentage of the total variance, suggesting that the relationships between the items within them are fairly weak. It was decided that a more detailed item-by-item analysis would be necessary in order to tease out any relationships with the cognitive style dimension. The findings from this analysis are outlined below.

### 3.3 Findings concerning the second set of research questions

In order to look for relationships between the holistic/analytic cognitive style and the questionnaire, a three-way analysis of variance was carried out for cognitive style, gender and language of study on each of the individual items in the questionnaire.

Significant main effects were found for the CSA on three of the items. Analytic participants were significantly more likely than holistic participants to prefer studying alone (item 8) and estimating their own language learning progress (item 20). Participants with a holistic cognitive style were significantly more likely to prefer speaking the language in class (item 12). These findings are as predicted. The two activities favoured by the analytic participants have already been found to relate to FL. The fact that holistic participants preferred speaking the language in class is interesting as this has been a predicted, but until now unproven characteristic of FD students. The fact that it is related to the holistic cognitive style suggests that Riding is to some extent justified in his claim that the holistic cognitive style is a positive interpretation of FD. Speaking the language in class was one of four items
that loaded on the "communicative language learning" factor described above. None of the other three items on this factor (finding opportunities to speak the language outside the classroom, visiting a country where the language is spoken, and watching and listening to the language at home) were found to be related to the holistic cognitive style. Interestingly, these other items reflect a much more independent approach to language learning. This suggests that holistic language learners like to learn through communicative activities but they prefer these activities to take place in a classroom environment. This may be because classroom-based activities are clearly defined and controlled by the teacher.

Significant main effects were found for gender on three of the items. Males were significantly more likely than female participants to prefer being left to find out mistakes for themselves (item 11), to create long-term goals for language learning (item 25) and to focus on the overall objectives of the learning programme (item 37). Thus men claimed to be more self-directed in their language learning than did women.

A significant main effect was found for language for one item only. Students of Spanish were more likely than students of Japanese to want to be given problems to work out for themselves (item 7). One reason for this may have been that the students of Spanish got to a level where they felt that they could work independently more quickly than did the students of Japanese.

There were significant interactions between cognitive style and language on four of the items. Making time to study on a regular basis (item 26) was favoured by analytic students of Spanish and holistic students of Japanese. Holistic students of Spanish and analytic students of Japanese were more likely to want to use the context to work out the meaning of unfamiliar words (item 3), focus on the overall objectives of the learning programme (item 37) and help the teacher to design the training programme (item 38). The fact that these strategies were favoured by either holistic or analytic learners depending on the language being learned is perhaps a reflection of the complexity of the strategies themselves. Take for example, the strategy of focusing on the overall objectives of the learning programme, which was a strategy favoured by holistic students of Spanish and analytic learners of Japanese. This strategy may be seen as "analytic" in that it involves breaking down the general aim of the programme into a number of separate objectives. On the
other hand it may be seen as “holistic” in that it involves taking an overview of the whole programme. The students of Japanese may have interpreted it in the first way, whereas the students of Spanish may have interpreted it in the second way.

There were significant interactions between cognitive style and gender on three of the items. Holistic males and analytic females were most likely to prefer looking up all or most new words in a dictionary (item 17). Analytic males and holistic females were most likely to prefer doing language drills in class (item 33) and breaking the learning process down into manageable parts (item 36). Again, it appears that the strategies themselves are too complex to be classified as either “holistic” or “analytic” but that they have both holistic and analytic components.

There were significant interactions between gender and language on three of the items. Male students of Spanish and female students of Japanese were more likely to prefer reading without looking up every word (item 19), and watching videos in class (item 22). Male students of Japanese and female students of Spanish were more likely to create their own short-term goals for language learning (item 24). Again, this suggests an inherent complexity in the strategies themselves.

There were significant three-way interactions between cognitive style, language and gender on five of the items. Of all the students studied, analytic female students of Japanese were most likely to find opportunities to speak the language outside the classroom, plan their learning in advance, study alone, learn grammar rules, and focus on the overall objectives of the learning programme. This is interesting as the majority of these strategies reflect an independent approach to language learning and as such one would expect them to be favoured by analytic students. It appears that when the language being learned demands an independent approach, and when the students are female, the relationship between the analytic cognitive style and language learning strategy preferences is particularly strong. However, I would refrain from drawing too many inferences from this finding as the sample of analytic female students of Japanese in this study was statistically rather small (N = 15).

4. Conclusions, pedagogical implications and applications
The relationship between the holistic/analytic cognitive style and second language
learning is clearly not straightforward. It does not map neatly onto either Willing’s or Ehrman’s models but it does overlap with them in interesting ways. One of the most interesting findings is that holistic learners displayed a preference for communicative language learning activities. This preference has for a long time been thought to be associated with FD, but this has never been demonstrated to date. The finding provides support for Riding’s description of the holistic cognitive style as a positive reconceptualisation of FD. However, these holistic learners bear only a partial resemblance to Willing’s communicative learners, as their preference for communicative activities is limited to the classroom. They do not appear to display the same levels of independence as Willing’s communicative learners. One might also infer that these students resemble Ehrman’s Type 3 learners as they are able to use the environment to help them, but do not exhibit independence. The finding that the communicative orientation of holistic learners may be restricted to the classroom has interesting pedagogical implications. It suggests that, although these students may appear keen to participate in communicative activities in the classroom, additional training and confidence-building activities may be necessary to prepare them for language use in the “real world”.

As predicted, analytic learners appear to exhibit many FI characteristics (for example preferring to study alone and estimating their own language learning progress). This suggests that they correspond to Ehrman’s Type 1 or Type 2 learners. However, only the analytic learners of Japanese claimed to make use of context. This suggests that they might be Type 1 learners, whereas the learners of Spanish are more likely to be Type 2 learners. This finding is interesting; on the one hand it might suggest that Type 1 learners are attracted to more difficult languages, though on the other hand, it might imply that there is something in the nature of those languages, or in the way that they are taught that encourages the students to adopt different approaches to learning. Further research is required to investigate these issues.

Figure 3 makes a cautious attempt to relate the holistic/analytic cognitive style dimension to Ehrman’s model in the light of the findings made in this study. These suggest that Type 1 or Type 2 learners are more likely to have an analytic cognitive style, depending on the language being learned, whereas Type 3 learners are more likely to have a holistic cognitive style.
Figure 3. Visual representation of correspondences between Ehrman’s, Willing’s and Riding’s cognitive style models.

Figure 4 attempts to relate the holistic/analytic cognitive style dimension to Willing’s model in the light of the findings made in this study. Holistic learners claimed to prefer activities in which they practised the language, suggesting that they prefer to take a concrete approach rather than an analytic one. However, they appeared to be most comfortable doing so in the relatively safe classroom environment, suggesting a preference for an authority-oriented approach rather than a communicative one. Analytic learners preferred to take control over the learning process and to focus on grammar rules, thus suggesting an analytic, communicative learning style. This was particularly true of female students of Japanese.

Figure 4: Relationships between the holistic/analytic cognitive style continuum and Willing’s model.
The fact that the holistic/analytic cognitive style dimension is to some extent related to Ehrman's and Willing's models suggests that it may serve as a useful research tool in SLA. It has already been used extensively in educational psychology to examine the relationships between cognitive processes and learning behaviours. In SLA, one might, for example, use it to establish whether or not there is a cognitive basis for the widely observed distinction between those students who are concerned with detail and accuracy and those who simply want to get their general message across (see, for example, Oxford and Anderson, 1995).

One of the most interesting findings made in this study is that the majority of the relationships between cognitive style and language learning strategies depend on factors such as gender and the language being learned. There are many other learner and situational variables that are equally likely to have an effect on strategy preferences. For example, one might expect the relationship between cognitive style and strategy preferences to be affected by factors such as the age of the learners, the task requirements, the stage of study, previous language learning experiences, cultural background, motivation and aptitude. Once these factors have been taken into account, the relationship between cognitive style and language learning strategy preferences may, in fact, be rather small.

On the other hand, the relative rigidity of cognitive styles has pedagogical implications. Analytic learners appear to have a distinct preference for studying alone and estimating their own language learning progress, whereas the holistic learners are significantly more likely to prefer speaking the language in class. This suggests that some students have an intrinsic preference for these activities, whereas it may be difficult to persuade others to engage in them. Furthermore, the teachers' own cognitive styles may well influence the types of learning activities that they expect their students to carry out. It would be worthwhile encouraging teachers to find out from their students whether they prefer to work individually or in groups, whether they prefer to learn from rules or examples and context, and whether or not they appreciate feedback. It might also be useful for them to establish why their students favour particular approaches to learning, to work out to what extent these approaches reflect their cognitive style, and to what extent they simply reflect the ways in which they have been encouraged to learn in the past. This might give the teachers insight into the ways in which their own preferences and expectations shape their lessons, colour their opinion of their students and affect the motivation of those students.
The fact that the relationship between the holistic/analytic cognitive style continuum and strategy preferences varies according to the language being studied has implications for language teaching. These differences may result from the way in which the languages have been taught, or they might reflect differences in the way the languages themselves are perceived by the students. As we saw above, in this study analytic participants were more likely to choose to study Japanese and holistic participants were more likely to choose to study Spanish. This suggests that the strategies adopted by the students are likely to vary according to the perceived requirements of the learning programme, and the way in which a language is presented. It is therefore important that potential language students be made aware of the teaching approach that will be adopted in the programme and of the expectations that will be made of them in terms of learning strategies. Language teachers should in turn be aware of their own cognitive style, the way in which this affects the way they teach, and of the learning strategy demands that they place on their students.

Acknowledgements
I would like to express my sincere gratitude to John Klapper, John Rees and Richard Riding for contributing to the design of this study and helping with the data collection. I am also grateful to the staff of the Language and Media Resources Centre and the Modern Language Unit for their assistance in the study. Finally, I would like to thank Dan Malt for his patient proof reading and many insightful comments.

Appendix A.
Language learning strategy questionnaire

*How do you learn best?*

For each of the language learning activities below say how helpful the activity would be for you, by circling a number from 1 to 5.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Not very helpful</td>
</tr>
<tr>
<td>2</td>
<td>Slightly helpful</td>
</tr>
<tr>
<td>3</td>
<td>Moderately helpful</td>
</tr>
<tr>
<td>4</td>
<td>Helpful</td>
</tr>
<tr>
<td>5</td>
<td>Very helpful</td>
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<td>Language learning activities</td>
<td>How helpful?</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>1. Taking careful notes in class</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>2. Using mime and gestures when I cannot think of a word</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>3. Using the context to work out the meaning of unfamiliar words</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>4. Finding opportunities to speak the language outside the classroom</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>5. Working systematically through a textbook</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>6. Making guesses about the meaning of unfamiliar words</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>7. Being given problems to work out for myself</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>8. Studying by myself, alone</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>9. Having as much of the lesson as possible conducted in the foreign language</td>
<td>1 2 3 4 5</td>
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<tr>
<td>10. Being told of my mistakes by the teacher or textbook</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>11. Being left to find out my mistakes by myself</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>12. Speaking the language in class</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>13. Visiting a country where the language is spoken</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>14. Seeing new words in context</td>
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<tr>
<td>15. Guessing what someone will say next when speaking the language</td>
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<tr>
<td>16. Playing language learning games in class</td>
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<td>17. Looking up all or most new words in a dictionary</td>
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<tr>
<td>18. Planning my learning in advance</td>
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<td>19. Reading without looking up every unfamiliar word</td>
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<tr>
<td>20. Estimating my own learning progress</td>
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<tr>
<td>21. Watching videos and listening to the language at home</td>
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</tr>
<tr>
<td>22. Watching videos in class</td>
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<tr>
<td>23. Learning about the culture of the language</td>
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<tr>
<td>24. Creating my own short term goals for language learning</td>
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<td>25. Creating my own long term goals for language learning</td>
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<td>26. Making time to study on a regular basis</td>
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<td>27. Using CD Roms, the Internet and other computer technology</td>
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<tr>
<td>28. Doing pair work and group work in class</td>
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<tr>
<td>29. Asking for help when I do not understand</td>
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30. Learning from examples  & 1 2 3 4 5  
31. Learning grammar rules  & 1 2 3 4 5  
32. Doing written exercises which involve filling in the correct forms of verbs in sentences  & 1 2 3 4 5  
33. Doing language drills in class  & 1 2 3 4 5  
34. Discovering grammar patterns for myself  & 1 2 3 4 5  
35. Learning lists of vocabulary  & 1 2 3 4 5  
36. Breaking the learning process down into parts  & 1 2 3 4 5  
37. Focusing on the overall objectives of the learning programme  & 1 2 3 4 5  
38. Helping the teacher design the training programme  & 1 2 3 4 5  

Name: ________________________________

Would you be prepared to come and discuss your language learning at a later stage during the year? Yes/No

*Feedback will be provided on your responses to this questionnaire.*

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**Appendix B.**

**Factor analysis of language learning activities**

*Only loadings which were greater than 0.4 or less than −0.4 are shown.*
<table>
<thead>
<tr>
<th>Language learning activities</th>
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<th>Factor 3</th>
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<td>Being given problems to work out for myself</td>
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<td>Studying by myself, alone</td>
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<td>Having the lesson conducted in the foreign language</td>
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<td>Being told of my mistakes by the teacher or textbook</td>
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<td>Planning my learning in advance</td>
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<tr>
<td>Estimating my own learning progress</td>
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<td>Learning lists of vocabulary</td>
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<td>Focusing on the overall objectives of the learning programme</td>
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</table>
Notes
1 In SLA research, the distinction between cognitive style and learning style has become somewhat blurred, leading some researchers (for example Skehan, 1998) to simply use the word “style”.

2 As with all cognitive styles, this categorization into types is a matter of degree. FI and FD refer to poles of a continuum, rather than distinct categories.

3 The word “activity” was used in the questionnaire, rather than “strategy” in order to facilitate understanding by the participants. Furthermore, some of the strategies listed in questionnaire, particularly those taken from Willing’s (1988) research are more accurately described as “activities” than as “strategies”.

4 All relationships described as “significant” in this article are significant at the 0.05 level for a two-tailed test.

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