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Cognitive processes involved in performing the IELTS Speaking Test: Respondents' strategic behaviours in simulated testing and non-testing contexts

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Abstract

Research on second-language acquisition offers repeated findings suggesting a positive relationship between learners' strategy use and second-language performance. From the language-testing perspective, however, the evidence that is needed to substantiate how test-takers' strategic behaviours may interact with test performance in the speaking domain is grossly lacking, even though the strategic component has been part of the language-ability and communicative-competence models that numerous researchers have put forward over the past three decades.

In this context, this project sets out to probe and describe the strategic behaviours that test-takers/learners used when performing the International English Language Testing System (IELTS) Speaking Test. Specifically, the study involved collecting stimulated verbal report data from 40 Chinese-speaking, English-as-an-additional-language students at both intermediate and advanced levels, to examine the strategic behaviours of those who perform the IELTS Speaking Test in a simulated testing situation versus those who perform it in a non-testing situation. The study was designed to analyse test-takers'/learners' strategic behaviours, through both elicitation from stimulated recalls carried out in the participants' first language and observation of the participants' actual production during their performance of the three IELTS speaking tasks.

The findings provided IELTS with an empirically grounded understanding of learners' strategies in performing the three tasks of the IELTS Speaking Test in both simulated testing and non-testing situations. The results showed that participants used 90 different individual strategies during the IELTS Speaking Test and overall, there were 2454 instances of strategy use identified in participants' performing of the three tasks. Of the six strategy categories, *metacognitive*, *communication*, and *affective* strategies had the highest percentages. Results from the mixed-model multivariate analysis of variance suggested that there were statistically significant between-subjects effects for *context* (i.e., simulated testing vs. non-testing), with a moderate effect size. The between-subjects effects were not statistically significant for *proficiency level* (i.e., intermediate vs. advanced level). *Task* had a significant within-subjects effect, with a large effect size, but there was a significant interaction between *task* and *context*, with a moderate effect size. The effects of the three tasks on strategy use were statistically significant with respect to the *affective* and *communication* strategy variables, with small to moderate effects.

The theorisation of strategic competence as an integral component of the construct of communicative competence, and, by extension, of strategy use needs to be carefully considered. The findings generated point to the need to conduct multifactorial experiments involving multivariate statistical analysis. The report concluded with statements about empirical and methodological implications and specific directions for future research that should involve an adequate sample size based on the power analysis, as well as an inter-disciplinary approach to gain insight into the complex nature of test-takers'/learners' cognitive processes and strategic behaviours.

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Introduction from IELTS

This study by Li-Shih Huang from the University of Victoria, Canada was conducted with support from the IELTS partners (British Council, IDP: IELTS Australia, and Cambridge English Language Assessment) as part of the IELTS joint-funded research program. Research studies funded by the British Council and IDP: IELTS Australia under this program complement those conducted or commissioned by Cambridge English Language Assessment, and together inform the ongoing validation and improvement of IELTS.

A significant body of research has been produced since the joint-funded research program started in 1995; over 90 empirical studies having received grant funding. After undergoing a process of peer review and revision, many of the studies have been published in academic journals, in several IELTS-focused volumes in the *Studies in Language Testing* series (http://research.cambridgeesol.org/research-collaboration/silt), and in *IELTS Research Reports*. To date, 13 volumes of *IELTS Research Reports* have been produced.

The IELTS partners recognise that there have been changes in the way people access research. In view of this, since 2011, *IELTS Research Reports* have been available to download free of charge from the IELTS website, www.ielts.org. However, collecting a volume's worth of research takes time, delaying access to already completed studies that might benefit other researchers. Thus, individual *IELTS Research Reports* are now made available on the IELTS website as soon as they are ready.

This report considers learners' strategy use vis-à-vis the IELTS Speaking Test. Models of communicative language ability, on which most language tests are based, generally include strategic competence as one component (e.g., Bachman, 1990; Canale & Swain, 1980). However, limited empirical work has been done on strategic competence, especially in the context of language assessment. This study goes some way towards addressing that gap in the literature.

Participants in the study were divided into two groups, with one group doing the IELTS Speaking Test under a simulated testing condition and another group doing so under a learning/control condition. Verbal protocols were then employed for participants to report on the strategies they used. Strategies were classified into six categories: approach, communication, cognitive, metacognitive, affective, and social.

Perhaps the first thing to notice about the findings is the wide range of different strategic behaviours that participants reported using. Across all three tasks that comprise the IELTS Speaking Test, 90 distinct strategies were identified. Analysis also showed that participants exhibited different strategic behaviours on the three speaking tasks. These findings would seem to show the wisdom of having a speaking test composed of multiple tasks, as it allows candidates to demonstrate a wider range of behaviours, providing a fuller picture of what they can do.

The most commonly reported strategic behaviours fell under the communicative and metacognitive categories, which is not unexpected, given the nature of the test construct. The IELTS Speaking Test employing a face-to-face format also resulted, as expected, in participants reporting strategic behaviours falling under the social category, something which indirect speaking test formats are unable to elicit. Social strategies, however, represented the smallest percentage among the six categories. This is probably the result of a design feature of the IELTS Speaking Test, having an interview frame that constrains the possible types of interaction (cf. reports by Seedhouse and Harris and by Ducasse in *IELTS Research Reports* Volume 12). The constraint is meant to help ensure test reliability and fairness, and it may be worth considering whether an appropriate balance has been achieved between validity and reliability in this case.

While the study took care to compare participants under simulated testing and learning conditions, less is known about strategy use in real-world speaking contexts, which is ultimately the domain tests are interested in assessing. More research in this regard will make it possible to compare strategy use in real life and in language tests, and make clearer the extent to which exams exhibit cognitive and construct validity. On another level, the study repeats the finding of other studies that found no difference in strategy use across proficiency levels. This raises questions about the precise nature of this component of communicative language ability. Further theorising and research is needed to validate the notion of strategic competence itself, so that teachers can teach it and testers can test it.

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1 INTRODUCTION

As Cohen (2012) stated, test items and tasks must measure what they purport to measure. As such, one issue that concerns researchers and theorists in both the second-language acquisition (SLA) and language testing (LT) fields is how to best validate the constructs that underlie language tests. As researchers from both fields have pointed out, it is necessary to know the inferences that are explicitly and implicitly made based on test-takers' performance (e.g., Bachman and Cohen, 1998, 2006; Young, 2000). Among those inferences, there is the need to understand the strategic behaviours underlying a test-taker's performance.

As Fulcher (2003) pointed out, "Strategies are concerned with the relationship of the internal processes and knowledge base of the test-takers to the external real-time action of communicating" (p 33). Canale and Swain (1980) were the first to identify strategic competence as an integral part of communicative competence, and they defined *strategic competence* as: "verbal and non-verbal communication strategies that may be called into action to compensate for breakdowns in communication due to performance variables or insufficient competence" (p 30). Later, extending Canale's (1983) and Swain's (1985) work, Bachman (1990) expanded the notion of strategic competence and hypothesised that it underlay all language use. Bachman and Palmer (1996), in their evaluation and modification of the communicative competence model, postulated that metacognitive strategies play a central role in test-taking.

Over the past four decades, SLA research on learner strategies has demonstrated that learners' strategy use is associated with SLA and performance (see Cohen and Macaro, 2008). From the LT perspective, however, test-takers' strategic behaviours have not been given sufficient attention, even though they have been included in the language ability models or communicative competence models that numerous theorists in the field have proposed (e.g., Bachman, 1990, 2002; Douglas, 1997; Fulcher, 2003). Recently, Weir and O'Sullivan (2011) included cognitive validity in their model of conceptualising test validity and viewed this cognitive validity as dependent on the processes that test-takers use in responding to test items and tasks.

With this view in mind and in light of the lack of evidence from examinations of construct-relevant strategic behaviours in the speaking domain, this project set out to probe and describe the strategic behaviours that respondents use when performing the IELTS (International English Language Testing System) Speaking Test in simulated testing (here after "testing") and non-testing situations.

As recent learner-strategies research has indicated, strategy use varies across tasks (e.g., Huang, 2004, 2010; Swain et al., 2009) and contexts (e.g., Tarone, 1998). In the present study, "tasks," which are defined as activities "that . . . [involve] individuals in using language for the purpose of achieving a particular goal or objective in a particular situation" (Bachman and Palmer, 1996, p 44), refer specifically to the three speaking tasks in the IELTS Speaking Test. As Cohen and Olshtain (1993) pointed out, "not all speaking tasks are created equal . . . there are tasks which make far greater demands on learners than do others" (p 50). Macaro (2006) also urged researchers to collect evidence to systematically map out strategies against second-language (L2) tasks in order to "[attain] greater robustness" if strategies can "[contribute] to a parsimonious framework that can be applied to a number of learning situations" (p 329). The lack of empirical evidence to clarify whether strategies maintain their integrity across contexts indicates a grave need for task-specific, strategy-use data to examine the patterns of learner strategies across tasks and contexts by learners of different proficiency levels.

Findings from the present study point to the strategies that learners used to perform each speaking task in the IELTS Speaking Test under both testing and non-testing situations. By involving both testing and non-testing situations, the study aims to contribute to the fields of SLA and LT in response to the call for a fuller picture of the oral construct with the provision of cognitive-validity evidence. This report first provides definitions of strategic behaviours and how they relate to the construct of speaking, followed by a brief review of relevant research in the literature. Then, the study's research design and methodology are described, and key findings are presented. Before concluding, the empirical and methodological implications are presented.

2 RELATION TO THE EXISTING LITERATURE AND RESEARCH

2.1 Defining strategic behaviours

Theoretically, *strategic behaviours* are defined as "the conscious, goal-oriented thoughts and actions that learners use to regulate cognitive processes with the goal of improving language learning or language use" (Huang, 2010, p 246). For this study, they are defined as test-takers' (in the testing context) or learners' (in the non-testing context) conscious thoughts and actions that are directly related to the test-taking/task performing process and that are used to acquire or manipulate information.

Operationally, these strategic behaviours are the observable actions taken by test-takers/learners in this study, as well as their thoughts elicited by means of verbal, think-aloud reports. Strategy use can be argued to be closely linked to cognitive processes, since the term "cognitive processes," which is taken from cognitive psychology, refers to all processes by which sensory input is transformed, reduced, elaborated, stored, recovered, and used (Neisser, 1976). Strategies are deliberate thoughts and behaviours test-takers/learners use to manage or carry out cognitive processes with the goal of successful test/task performance.

On the basis of this conceptualisation, this study examined strategic behaviours as the behaviours that test-takers/learners used to complete the three IELTS speaking tasks under testing and non-testing situations.

2.2 Strategic competence as part of the speaking construct

LT researchers have ongoing concerns about the various sources of variability that may influence performance on language tests (e.g., Bachman, 1990; Bachman and Palmer, 1996; Chalhoub-Deville 2001; McNamara, 1996; Purpura, 1999; Shaw and Weir, 2007). Even though researchers and theorists view the L2 communicative construct as multidimensional (e.g., Bachman, 1990; Bachman and Palmer, 1996; Purpura, 1998; Wesche, 1987), as pointed out by Kunnan (1998) and Douglas (2000), research has yet to support with evidence the specific components and processes underlying this multidimensional construct. It also has yet to show how these components interact with each other in language use. Among these components are the strategies that test-takers/learners use.

Learners'/speakers' ability to use communication strategies to deal with communication breakdowns has been referred to as their *strategic competence*, which is a component of Canale and Swain's (1980) widely cited theoretical framework of communicative competence. Since then, Canale (1983), Bachman (1990), Bachman and Palmer (1996), Douglas (1997) and Fulcher (2003) have all further discussed and expanded this component to include various strategic components (see Swain et al., 2009). Much systematic research has examined the construct validation of the concept of communicative competence in L2 education (e.g., Bachman and Palmer, 1996; Harley, Cummins, Swain and Allen, 1990; Jamieson et al., 2000; Milanovic et al., 1996; Palmer, Groot and Trosper, 1981; Swain, 1985; Wesche, 1981). Whether it is termed Canale and Swain's (1980) communicative competence framework, Bachman's (1990) and Bachman and Palmer's (1996) communicative language ability model, or the social-cognitive construct representation (see Chalhoub-Deville, 2003), strategic competence remains critical and has been recognised as interacting with other components of communicative competence (Swain et al., 2009). Although there is a recognition that strategies and the interaction among strategies and tasks may affect performance, and that the strategies that test-takers/learners use can provide insights concerning test validity, research remains lacking about the strategic component in the speaking domain and about the precise nature of strategic competence as applied to SLA and LT contexts.

Cognitive validity relates directly to Messick's (1989) evidence for substantive validity in assessing the theoretical assumptions about the skills and abilities that test-takers use when answering test items. The key idea is that test developers and users need to verify that test-takers actually use the assumed processes, as opposed to other, unrelated processes that introduce construct-irrelevant variance into the scores. In such a case, a speaking task performed in a testing situation may lead to different oral language production than how the task would be performed under a non-testing situation. For example, test-takers may focus more on accuracy and/or fluency than on communicating ideas. The differing focus may lead to the deployment of different strategies to accomplish communicative goal(s).

The possibility that the context of testing may influence performance and that oral language production and strategic behaviours in a testing situation may differ from those in a non-testing situation raise a major issue about how the test assesses learners' communicative competence, as well as the extent to which a test performance can represent the cognitive processing involved in performing similar tasks in real-world encounters. Douglas (2000) stated that validation is "a dynamic process in which many different types of evidence are gathered and presented" and through which we can begin to obtain a better understanding of what a particular test is actually testing (p 258). Chalhoub-Deville (2001) also called for language researchers and test constructors to "expand their test specifications to include the knowledge and skills that underlie the language construct" (p 225). The strategic behaviours that test-takers use when responding to assessment tasks is an important source of construct-validity evidence (e.g., Bachman, 2002; Chalhoub-Deville, 2001; McNamara, 1996), and the subject warrants ongoing, rigorous, and in-depth investigation.

2.3 Taxonomies and research on speaking strategies in the second-language acquisition (SLA) and language testing (LT) fields

Since the pioneering research of Rubin (1975) and Stern (1975), researchers have proposed various ways of classifying learner strategies (e.g., Nakatani, 2006; O'Malley and Chamot, 1990; Oxford, 1990, 2011; Rubin, 1987; Stern, 1992; Wenden and Rubin, 1987), with some overlap among the strategy categories across various taxonomies or systems of classification. Although there is some consensus in the categorisation of learner strategies, reaching a consensus regarding a unified theoretical underpinning for learner strategies remains a challenge that has generated much debate (see Cohen, 2011; Cohen and Macaro, 2008; Macaro, 2006). In the testing context, some researchers have distinguished between construct-relevant and construct-irrelevant strategies (e.g., Allan, 1992; Cohen, 2012), and some have criticised the definitional "fuzziness" of the categorisation of learner strategies and the research tools that researchers have used (e.g., Dornyei, 2005; Gao, 2007; Tseng et al., 2006). Some of the issues regarding the categorisation of strategies are, for example: strategies may be used in combination with others; a single strategy may be used for multiple purposes; different individual strategies may overlap; or different individual strategies may be sub-dividable into other sub-strategies (e.g., Cohen, 2007, 2012; Dornyei, 2005; Nikolov, 2006; Rose, 2012).

In terms of research, much work in the SLA field in the 1970s was devoted to descriptive studies that identified learner strategy types and frequencies (e.g., Rubin, 1975; Naiman, Fröhlich, Stern and Todesco, 1978).

Since the 1980s, the focus has shifted from a product to a process orientation. This shift in focus has generated much interest in the role of cognitive processing and the study of strategy use in SLA (e.g., Cohen, 1984; Cohen and Aphek, 1981; Homburg and Spaan, 1981; O'Malley and Chamot, 1990; Wenden and Rubin, 1987). In the 1990s, research established the role that learner strategies play in making language-learning more efficient and successful (e.g., O'Malley and Chamot, 1990; Oxford, 1990).

Studies also have shown a positive association between proficiency level and the use of certain types of strategies, especially, for example, metacognitive (e.g., Flaitz and Feyten, 1996), cognitive (e.g., Oxford and Ehrman, 1995), compensation (Dreyer and Oxford, 1996), and social-affective strategies (Nakatani, 2006). In the area of speaking, several studies have addressed how learner strategies can help learners develop their oral communication ability (e.g., Cohen and Olshtain, 1993; Cohen, Weaver and Li, 1996; Dadour, 1995).

In the language testing field, since 1970 when Bormuth first called for researchers to pay more attention to how test-takers respond to questions in first-language testing tasks, a growing number of studies have examined the strategies and processes of test-takers (e.g., Anderson, Bachman, Perkins and Cohen, 1991; Buck, 1991; Cohen, 1998; Phakiti, 2003; Purpura, 1997, 1998; Wijh, 1996; Yoshida-Morise, 1998). But little research has examined the interaction among language proficiency level, strategic behaviours, and performance in speaking with inconsistent results in terms of the relationship between proficiency level and strategy use (see Cohen, 2011; Swain et al., 2009). Until now, no studies have investigated test-takers'/learners' strategic behaviours in performing IELTS-like speaking tasks and the relationships among language-proficiency level, reported strategic behaviours, and speaking performance in testing and non-testing contexts.

Even though learner strategy research has flourished over the past 40 years, strategy use in relation to tasks and contexts has only recently been recognised as an area that needs significant empirical evidence to move the field forward (Macaro, 2006). Research on variations in tasks and contexts, as well as their effects on language use, has supported the hypothesis that both performance and strategy use differ across tasks (e.g., Bachman and Cohen, 1998; Poulisse, 1990; Huang, 2004, 2007, 2010; Swain et al., 2009). Findings from previous research have also suggested that less-proficient L2 learners tend to use the same strategies repeatedly, whereas more-proficient L2 learners draw on a greater variety of strategies to accomplish the different language tasks at hand (see Anderson, 2005). Thus, the relative effectiveness or non-effectiveness of strategy use may be task-, context-, and learner-dependent. In other words, the nature of a strategy remains constant; it is the *task demands* that vary and that bring about variation in different learners' deployment of strategies (Macaro, 2006).

In the present study, all speaking strategies used during the communicative event (i.e., for the purpose of performing the IELTS speaking tasks) were examined. Given that the study involved both testing and non-testing situations and that responding to a language measure naturally involves using strategies for different purposes (such as language learning, language use, and testing-related strategies), the analysis in this study used a strategy classification scheme based on a compilation of L2 use, learning, test-taking, and communication strategies in the theoretical and empirical literature (e.g., Cohen and Upton, 2006; Fulcher, 2003; Kæsper and Kellerman, 1997; O'Malley and Chamot, 1990, Oxford, 1990, 2011; Paribakht, 1985; Pressley and Afflerbach, 1995; Purpura, 1998; Swain et al., 2009; Yoshida-Morise, 1998; Yule and Tarone, 1997).

In this study, the analysis of test-takers'/learners' strategic behaviours included the following six major categories:
(a) *approach strategies* (i.e., orienting oneself to the speaking task)
(b) *communication strategies* (i.e., involving conscious plans for solving a linguistic problem to reach a communication goal)
(c) *cognitive strategies* (i.e., manipulating the target language for understanding and producing language)
(d) *metacognitive strategies* (i.e., examining the learning process to organise, plan, and evaluate efficient ways of learning)
(e) *affective strategies* (i.e., involving self-talk or mental control over affect)
(f) *social strategies* (i.e., interacting with others to improve language learning/use).

The present study included all the strategic behaviours that participants used to perform the IELTS speaking tasks. This decision was made for two reasons. First, previous strategy-use studies have included all strategic behaviours, and, for the purpose of comparing findings across studies, the coding scheme in this study was a synthesis of individual strategies and strategy categories in the literature. Second, including all strategies makes it possible to examine how specific strategies interact with oral production. If participants often use a certain strategy that is presumably construct-irrelevant to perform a specific task, then this needs to be attended to in test construction to eliminate items or tasks that may be susceptible to test-wiseness (i.e., responding to test items "without going through the expected cognitive processes" or "without engaging the second language . . . knowledge and performance ability") (e.g., Cohen, 2012, p 264; Yang, 2000).

This study examined both observable and reported strategic behaviours, as theoretically and operationally defined previously, in performing the IELTS speaking tasks. Strategic behaviours, encompassing the so-called "test-management strategies" (i.e., "the processes consciously selected to assist in producing [responses]" (Cohen, 2012, p 263) are also included because, while some may consider test-management strategies to be construct-irrelevant, one may also argue that such strategies as *organising thoughts*, *monitoring time*, *attending to the interlocutor's interest*, and so on are reasonably related to important skills involved in a speaker's ability to expressing opinions verbally or to engage in a dialogue, regardless of whether it is in a testing, simulated testing, or non-testing situation.

2.4 Stimulated retrospective recall as a data-gathering method

A large body of research in the area of learners' and test-takers' strategies has used questionnaires to elicit learners' strategic behaviours (e.g., Phakiti, 2003; Purpura, 1999; Taguchi, 2001; Yoshizawa, 2002). It is highly questionable how faithfully strategies elicited through questionnaire items not specific to a particular research/language context reflect learners' *actual* strategic behaviours in response to a task. Methodologically, to enhance the quality of the data, this study has gone beyond the common self-report or questionnaire-based methods used to gather strategy-related data.

As Macaro (2006) pointed out, "Questionnaires and inventories provide the *broad* picture; verbal reports (think-aloud techniques and task-based retrospectives) effectively yield insights into *skill-specific* or *task-specific* strategy use" (p 321, emphasis mine). Since the 1980s, verbal reports have been a primary research method used to gather data about learners' or test-takers' strategic behaviours. Among different verbal-report approaches, various types of verbal reporting (e.g., introspective, immediate retrospective and delayed retrospective) have been widely employed in L2 studies (Cohen, 1998, 2012; Ericsson and Simon, 1993; Gass and Mackey, 2000). For example, diaries or dialogue journals and verbal reports have been used extensively by L2 strategy researchers (e.g., Anderson and Vandergrift, 1996; Bowles and Leow, 2005; Carson and Longhini, 2002; Halbach, 2000; Schmidt and Frota, 1986; Phakiti, 2003).

Learners' introspection or retrospection may not provide a complete picture of any particular process and, as thoroughly examined by researchers across disciplines, is not without criticisms (e.g., Cohen, forthcoming; Ericsson and Simon, 1993; Gass and Mackey, 2000; Green, 1998; LoCastro, 1994, Selinger, 1983, Young, 2005). However, the data gathered from verbal reports enable researchers to examine what a test is actually measuring by tapping the underlying processes that are not accessible from the product (e.g., test/oral-language production scores), nor from other sources (e.g., observations) that test-takers/learners use to solve a problem or perform a task. As Ericsson and Simon's (1993) review of a large number of studies indicated, when the technique is used appropriately, verbal protocol analysis is a valid and useful procedure. Macaro (2006) also pointed out in his review of research on learner strategies that the methodology for eliciting learner strategy use is "at an acceptable level of validity and reliability" (p 321).

3 RESEARCH DESIGN AND METHODOLOGY

3.1 Guiding questions

This study was guided by the following inter-related research questions:

1. ***Strategic behaviours:*** When participants perform the IELTS speaking tasks, what strategic behaviours do they report that they employ to regulate their cognitive processes in testing and non-testing situations?

2. ***Strategic behaviours vis-à-vis contexts:*** Is there a difference in participants' reported strategic behaviours between testing and non-testing situations?

3. ***Strategic behaviours vis-à-vis proficiency levels:*** When participants perform the IELTS speaking tasks, are there differences in their reported strategy use between advanced versus intermediate participant groups in testing and non-testing situations?

4. ***Strategic behaviours vis-à-vis task types:*** Are there differences in reported strategy use in performing the three IELTS speaking tasks in testing and non-testing situations?

5. ***Strategic behaviours vis-à-vis oral language production:*** What are the relationships between participants' reported and observed strategy use in testing and non-testing situations and their oral-language production scores?

3.2 Research design and participants

The study involved four groups of international English-as-an-additional-language (EAL) students in British Columbia, Canada, with 10 participants in each group, for a total of 40 participants. Figure 1 shows the study's overall design.

Subgroups A and B were international EAL students at the advanced and intermediate levels of English language proficiency, respectively; members of subgroups A and B performed the IELTS Speaking Test under a simulated testing situation. Subgroups C and D involved two groups of international EAL students at the advanced and intermediate levels, respectively; members of subgroups C and D performed the same speaking tasks in the IELTS Speaking Test in a non-testing situation.

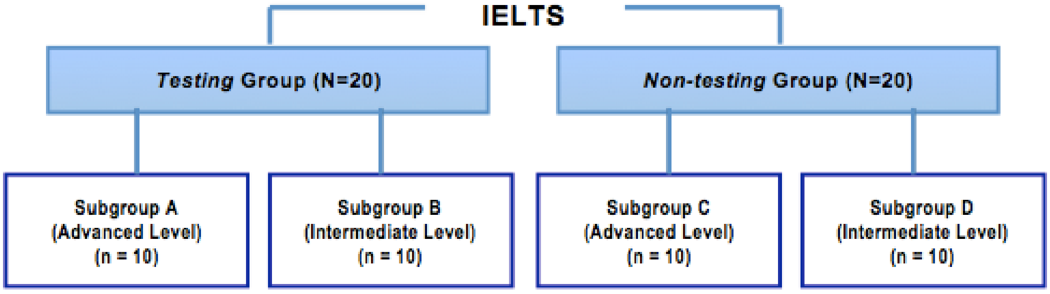

IELTS
Testing Group (N=20)
Non-testing Group (N=20)
Subgroup A (Advanced Level) (n = 10)
Subgroup B (Intermediate Level) (n = 10)
Subgroup C (Advanced Level) (n = 10)
Subgroup D (Intermediate Level) (n = 10)

Figure 1: Research design

In the testing context, members of subgroups A and B performed the IELTS Speaking Test in a simulated testing situation; i.e., IELTS-certified examiner A followed the exact guidelines and procedures in administering the test to participants. In the non-testing context, members of subgroups C and D performed the identical speaking tasks contained in the IELTS Speaking Test in a language-learning setting; i.e., IELTS-certified examiner B, who is also the participants' current or recent-past language teacher, was instructed to use the same tasks to practice speaking with participants.

Both the testing and non-testing groups were instructed prior to the testing and practicing session to treat the test or practice accordingly. Each participant was also reminded before the start of each of the three speaking tasks to perform the subsequent task in the way one would perform it in a formal testing situation for the testing-group or in a language-learning, practicing situation for the non-testing group. In the final think-aloud session, each participant was also asked whether he/she performed the test as requested.

The sample size for this study was chosen for the following reasons: (a) to contain costs, (b) to ensure that there would not be more variables than subjects so that statistical analyses could be conducted, and (c) to obtain in-depth reports of strategy use from each participant. Furthermore, the study focused on participants whose native language is Mandarin Chinese for the following reasons: (a) to elicit as much information as possible from participants by allowing them to freely choose which language to use during the stimulated recall process so that they could best express their thoughts, (b) to limit the study to participants who speak a language of which the principal investigator has expert knowledge, (c) to enhance the strength of conclusions with the resources available, (d) to deal with the issue of the representative nature of the participants, and (e) because, historically, test-takers who speak Chinese as their first language have constituted the largest pool of international students enrolled at the university from which the sample was drawn. They are also one of the largest groups of examinees in English-language proficiency testing in North America. Table 1 summarises the participants' background characteristics. (With the exception of one individual, all participants were majoring in finance or business at the time of the study.)

3.3 Research instruments

3.3.1 Background questionnaire

A questionnaire was distributed to all four groups to collect information about participants' backgrounds (e.g., age, gender, knowledge of other languages, educational experience, length of stay in English-speaking countries, and IELTS speaking test-taking experience and scores). All participants completed the questionnaire before the language proficiency pre-test. (All participants had previously taken the IELTS Speaking Test, with a range of reported IELTS scores from 5 to 6.5 and a mean of 5.8.)

3.3.2 Pre-test language proficiency

The oral proficiency of all participants was assessed prior to the start of the study by two experienced examiners who have extensive experience in in-house assessments from various language schools. The test was adapted from Swain et al.'s (2009) pre-test – the first part was modified, in that participants were required to tell a story using the pictures; the remaining parts and the time allowed for preparation and response were unchanged. The pre-test was used to recruit participants at the appropriate proficiency levels suitable for proceeding to the familiarisation test one week before the administration of the main speaking tasks. Note that the format of the pre-test simply involved the test administrators reading the instructions and questions out loud and then measuring the preparation and response time for each item; the test administrators were instructed to follow the procedures in terms of timing the responses exactly according to the test instructions.

Characteristic	Testing group	Non-testing group	Overall
Age (years)	M = 23.5, SD = 2.26	M = 24.2, SD = 2.69	M = 23.9, SD = 2.48
English language learning (years)	M = 10.92, SD = 1.79	M = 10.85, SD = 3.82	M = 10.88, SD = 2.95
Length of stay in English-speaking countries (months)	M = 22.05, SD = 19.37	M = 26.5, SD = 17.33	M = 24.3, SD = 18.31
Gender	Female: 9 (45%) Male: 11 (55%)	Female: 5 (25%) Male: 15 (75%)	Female: 14 (35%) Male: 26 (65%)

Table 1: Participants' characteristics (N = 40)

3.3.3 IELTS Speaking Test

Two versions of the IELTS Speaking Test were used. One version was provided to participants so that they could become familiar with the test and the task types, and the scores were also used to cross-check with the results from the pre-test and to divide the learners into the two proficiency levels for data analysis.

The intermediate group consisted of those respondents who scored 6.0 and below; the advanced group were those who scored above 6.0. This division is based on the institutional admissions requirement of an IELTS score of 6.0 and above.

The other version was used for the main study for both testing and non-testing groups. The mean scores for tests administered in sessions 1 and 2 were similar (familiarisation: *M* = 6.40, *SD* = 0.50; main: *M* = 6.31, *SD* = 0.54). By context, the scores also were similar in both situations (testing, familiarisation: *M* = 6.40, *SD* = 0.51; testing, main: *M* = 6.3, *SD* = 0.50; non-testing, familiarisation: *M* = 6.41, *SD* = 0.48; non-testing, main: *M* = 6.34, *SD* = 0.56).

The current testing time frame of 11 to 14 minutes was expanded for the administration of the test in the main study to facilitate stimulated recall immediately after each of the three speaking tasks. The task types are summarised in Table 2.

Task	Task type	Preparation time	Testing time
1	Answer questions about themselves and their families	None	3-4 min.
2	Speak about a topic	1 min.	2-3 min.
3	Engage in a longer discussion on the topic in Task 2	None	3-4 min.

Table 2: A summary of task types in the IELTS Speaking Test

Task 1 of the IELTS Speaking Test involves asking test-takers to respond to general questions about themselves (e.g., their homes, families, jobs, studies and interests) and a range of everyday familiar topics. Task 2 involves having test-takers talk on a particular topic for one to two minutes, with one minute of preparation time. The examiner then asks one or two questions to conclude this portion of the test. Task 3 involves a discussion of more abstract issues, which are linked to Task 2, with a similar set of directive prompts or input.

3.4 Data collection procedures

Before the two major data collection sessions, when interested participants first contacted the research assistant, the purpose of the research was clarified to them, following the university's ethical guidelines. Their IELTS test-taking experiences and scores were specifically asked in order to ensure that they met the general participant-selection criteria (i.e., Chinese-as-a-first-language and English-as-an-additional-language university-level students, with intermediate and above proficiency levels). Participants who met the preliminary selection criteria were scheduled to come to the first data collection session, where the procedures were followed as described below.

Session 1:

1. Each of the 40 participants was, again, provided with a clear explanation of the purpose of the study and what they would be required to do during the two data collection sessions. They were also given an opportunity to ask any questions that might have arisen since their recruitment, as per the university's ethical guidelines. We then asked participants to give their informed consent to participate.
2. Each participant completed the background questionnaire.
3. Each participant completed a 10-minute pre-test proficiency assessment.
4. Participants were individually administered a version of the IELTS Speaking Test that served to familiarise them with the task types to be expected in the following week.

5. Each participant tried out a stimulated recall session and engaged in a practice session of stimulated recall after his/her performance of the final speaking task. In other words, the test's time frame was not expanded in the administration of the three speaking tasks. During the practice stimulated recall session after Task 3, the examiner recorded the scores for each participant.

During the week between data-collection sessions 1 and 2, the principal investigator trained the research assistants in refining the questions and operations carried out during the stimulated recall sessions. Also during this week, three raters independently rated the audio clips from the 10-minute language-proficiency test to determine each participant's proficiency in spoken English. (The three raters each had graduate degrees and professional experiences in English language teaching.) The oral-language production scores derived from the familiarisation testing session were then used to corroborate results from the pre-test proficiency assessment and to divide the learners into the two proficiency levels for data analysis. During the familiarisation round, it was discovered that some participants already knew one of the certified examiners, as previously mentioned in Section 3.2. These participants were assigned to the non-testing group, and the rest were assigned to the testing group. Each participant's schedule for the following week was arranged accordingly and then confirmed by both email and phone.

Session 2:

1. The testing group, i.e., 20 participants, were formally administered another version of the IELTS Speaking Test. As with the familiarisation test administered in Session 1, the examiner followed the same script in the provision of the instructions and prompts when implementing the test to ensure a standardised management of the speaking test for test reliability and validity.

2. The non-testing group, i.e., 20 participants, were administered speaking tasks identical to those in the IELTS Speaking Test administered to the testing group. The tasks, which followed the same format, were administered in a non-testing situation, as described in Section 3.2.

3. All participants engaged in verbal reports through a process of stimulated recall *immediately* after performing each task (Bowles, 2010; Ericsson and Simon, 1993; Gass and Mackey, 2000, 2012; Green, 1998). While the participants engaged in the stimulated recall, both examiners rated and recorded each participant's spoken performance, using IELTS's official scoring criteria, before proceeding to the next task.

4. For both groups, the entire process was video-taped by two cameras and audio-taped by a digital recorder to (a) facilitate stimulated recall, and (b) prevent any unanticipated technical glitches that might occur when technology is used. This recall was conducted in the participants' first language immediately after performing each of the three IELTS speaking tasks so that the participants' short-term or working memory could be quickly accessed and the contents could be reported (Ericsson and Simon, 1993; Jourdenais, 2001).

3.5 Data coding and analyses

3.5.1 Data coding

All video and audio clips were organised and renamed with numbers to safeguard participants' identities. All 40 participants' stimulated recall sessions, for a total of 120 clips, were fully transcribed. Meticulous care was taken in the data-coding stage of the project. Data coding of all stimulated recall sessions and oral-production data (i.e., data gathered from the participants' actual performance during the IELTS speaking tasks) was carried out. The coding scheme of participants' strategic behaviours was modified, as previously mentioned, drawing on the classification systems synthesised from the literature in L2 learning and LT fields. The coding scheme consists of six strategy categories, namely *approach*, *cognitive*, *communication*, *metacognitive*, *affective*, and *social*. Appendix 1 includes definitions and examples captured from the data in both Chinese and English for all strategies.

This is the first study to include the coding of the oral-production data. The principal investigator (PI) and one research assistant (RA) independently coded 100% of the data from the stimulated recall sessions, as well as 100% of the oral-production data for strategic behaviours. Unlike the data from the stimulated recall sessions, which were fully transcribed, the oral-production data were coded directly from the recordings without transcription for two main reasons: (a) there was a need to contain costs, (b) the coding of strategic behaviours involved mainly observable strategy use that was absent from the participants' stimulated recalls, and (c) the coding was used to corroborate findings from the stimulated recall data. In other words, any observable strategic behaviours from the oral-production data that were not reported by participants during the stimulated sessions were added. Behaviours mentioned by participants in the stimulated recall sessions were double-checked and ambiguities in the reported strategies were verified. In addition, the second RA coded 60% of the data, and the third RA coded 30% of the data randomly selected from the data set. Inter-coder reliability was calculated by the number of agreements divided by the total number of coding decisions. The inter-coder agreement percentages between the PI and the three RAs were 96% for the first RA, 92% among the PI and RAs 1 and 2, and 91% among the three coders. All coding disagreements were discussed until they were resolved.

3.5.2 Sampling design matrix

For statistical analyses, a multifactorial experimental design was implemented with N = 40 participants, including two fixed factors (*context* and *proficiency level*), producing between-subjects effects, and three repeated measures (*tasks*) producing between-subjects effects. The factorial design matrix was balanced because there was an equal number (i.e., n = 10) of participants in each cell (Table 3).

Factors		**Repeated measures**		
Context	**Proficiency Level**	**Task 1**	**Task 2**	**Task 3**
Non-testing	Advanced	10	10	10
	Intermediate	10	10	10
Testing	Advanced	10	10	10
	Intermediate	10	10	10

Table 3: Factorial design matrix

The 40 participants were divided into two mutually exclusive groups according to *context*, termed *non-testing* (n = 20) and *testing* (n = 20). Each *context* was further sub-divided into two mutually exclusive subgroups according to their *proficiency level*, termed *advanced* (n = 10) and *intermediate* (n =10). The multifactorial model was crossed, because each *proficiency level* was the same in each *context*, meaning that each level of *context* could be compared with each *proficiency level*.

3.5.3 Dependent and independent variables

Repeated measures on the six dependent variables (i.e., the reported and observed strategies) were collected for the performance of three IELTS speaking tasks (denoted as *task 1*, *task 2*, and *task 3*). All groups performed an identical set of three tasks. The independent variables were the four groups of participants, stratified by the two factors, specifically *context* (testing vs. non-testing) and *proficiency level* (intermediate vs. advanced).

The six dependent variables used to measure strategy use were the following strategies: *affective*, *approach*, *cognitive*, *communication*, *metacognitive*, and *social*. Each strategy-use score was constructed by
(1) calculating a total strategy-use frequency score, by adding up the individual participants' scores for the use of individual strategies within each strategy category;
(2) computing the total individual strategy-use frequency score for each strategy category (i.e., the sum of the scores for *affective*, *approach*, *cognitive*, *communication*, *metacognitive*, and *social*) reported by each participant;
(3) converting each strategy-use score into a proportion of the total strategy-use score; and (4) performing arcsine transformations of the proportions.

Arcsine transformations were needed for the parametric statistical analysis, because (1) proportions are not continuous, but restricted in range from 0 to 1;
(2) proportions are usually not normally distributed, but tend to be skewed, clustering towards one or the other end of the range; (3) the arcsine transformation stretches out the extreme proportions close to 0 and 1, and compresses the proportions close to .5, thereby centralising the distributions; and (4) the transformed data fit better to the statistical model, providing for more precise inferences, including interactions. (The potential problem with using an arcsine transformation is that the descriptive statistics of arcsines are more difficult to interpret, because they are expressed in radians [Tabachnik and Fidell, 2007].)

3.5.4 Interaction

Because participants were exposed to multiple factors simultaneously and the level of each factor could potentially influence the level of every other factor, the interaction effects were evaluated. Each interaction reflects the effects of two or more factors acting in combination rather than alone (Hair et al., 2010). In this study, interactions implied that participants' strategies diverged in a non-parallel fashion with respect to the different levels of each factor. The interactions tested in this study were as follows: *context* x *level*, *context* x *task*, *task* x *level*, and *context* x *level* x *task*. Specifically, the following null hypotheses were tested:

- $H_0$1: There were no between-subjects effects (i.e., the mean scores for the dependent variables were not significantly different among the four mutually exclusive groups of participants with respect to *context* and *proficiency level*)

- $H_0$2: There were no within-subjects effects (i.e., the mean scores for the dependent variables were not significantly different across the three *tasks* performed consecutively by all participants)

- $H_0$3: There were no significant interactions among *context*, *task*, and *proficiency level*.

3.5.5 Mixed model multivariate analysis of variance (MANOVA)

The null hypotheses were tested to compare the mean arcsine-transformed scores reported by the four groups of participants for six types of strategy use (i.e., *affective*, *approach*, *cognitive*, *communication*, *metacognitive*, and *social*) in testing and non-testing contexts. A mixed model multivariate analysis of variance (MANOVA) with multiple dependent variables, fixed effects, and repeated measures, was justified to answer the research questions. MANOVA tests for the effects of one or more factors (categorical independent variables) on multiple dependent variables (measured at the scale/interval level). MANOVA creates a new composite dependent variable from a linear combination of multiple inter-correlated dependent variables, e.g., for six dependent variables, V_1, V_2, V_3, V_4, V_5, and $V_{6,}$ the new composite dependent variable, V_n is: $V_n = a_1V_1 + a_2V_2 + a_3V_3 + a_4V_4 + a_5V5 + a_6V_6$. The coefficients a_1 to a_6 are calibrated to provide maximal differences between V_n with respect to the effects of the specified factors.

The advantage of using MANOVA is that differences between mean values may not be identified when the dependent variables are tested individually, but MANOVA may reveal differences using a linear combination of dependent variables. In addition, MANOVA protects against Type I errors that may occur when multiple hypothesis tests are conducted (i.e., the null hypothesis of no significant difference is falsely rejected when, in fact, it should not be rejected). The probability of making a Type I error is 1 - $(1-\alpha)^{k}$ where α = the significance level and k = the number of tests performed (Hair et al., 2010). For example, if six tests are conducted to compare six dependent variables across participant groups in this study at the conventional significance level of $\alpha = .05$, then the probability of making a Type I error is .265 (i.e., about one in every four tests might provide erroneous results by random chance). Before MANOVA could be conducted, diagnostic tests were implemented to determine whether the data violated any of its theoretical assumptions.

Significance. Statistical significance was evaluated by comparing the *p* values of the inferential test statistics against a prescribed significance level ($\alpha = .05$). Note that the *p* values reflected statistical significance (i.e., whether or not the findings were caused by random chance), and did not necessarily imply that the results were important or had any meaningful implications in reality. Statistical significance is *not* equivalent to practical significance (i.e., the strengths of the relationships between the variables). Effect sizes were computed because they reflected the practical significance of the results. It is recognised that many researchers in education and psychology argue that the use of *p* values should be reconsidered, or at least reduced in importance, in favour of effect sizes (Ferguson, 2009; Hill and Thompson, 2004; Kotrlik and Williams, 2003; Kline, 2004; Kraemer et al., 2003). The advantage of effect sizes is that, unlike *p* values, they are not a function of the sample size. The effect size used in this study was eta squared (η^2), representing the proportion of the variance explained. Applying Ferguson's (2009) criteria, $\eta^2 = .04$ indicated a minimal effect; $\eta^2 = .25$ indicated a moderate effect; and $\eta2 = .64$ indicated a strong effect.

Sample size. In MANOVA, like all inferential statistical tests, the *p* values of the test statistics are a function of the sample size. If the sample size is too small, there is insufficient power to reject a null hypothesis, and a Type II error could occur (i.e., the null hypothesis is falsely not rejected when, in fact, it should be rejected). According to Hair et al. (2010, p 453) with respect to MANOVA, "As a bare minimum, the sample size in each cell (group) must be greater than the number of dependent variables. As a practical guide, a *recommended* minimum cell size is 20 observations" (p 453, emphasis mine). The sample size in each group in this study ($n = 10$) was greater than the number of dependent variables ($k = 6$); however, the size was half of the recommended minimum cell size of 20, which could potentially provide insufficient power for MANOVA.

Normality. Each dependent variable, theoretically, should be normally distributed; MANOVA is robust, however, meaning that multivariate statistics are not necessarily compromised by deviations from normality. As long as the factorial design is balanced (Table 3), and deviations from normality are caused by skewness and not outliers, MANOVA is relatively insensitive to the shape of the frequency distribution (Hair et al., 2010). Deviations from normality were identified in this study using Kolmogorov-Smirnov (*K-S*) statistics (see Table 4). Only one variable (*social* strategies) deviated strongly from normality at $\alpha = .001$ (*K-S* = 2.763, $p < .001$).

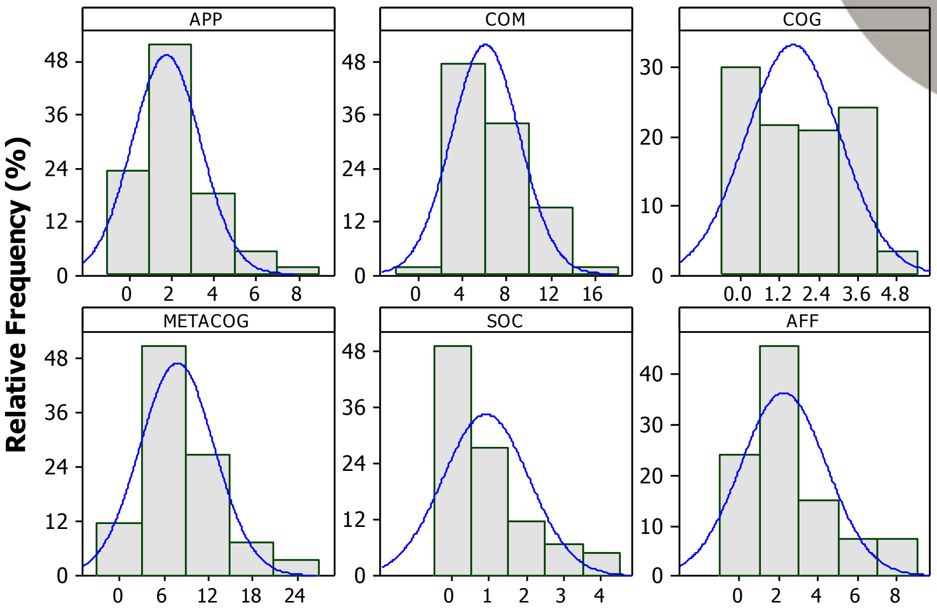
The distributions of the six dependent variables after combining the frequency counts for the participant groups are displayed in Figure 2. The distribution of *social* strategies was skewed. Although the distributions of *approach*, *communication*, *cognitive*, *metacognitive*, and *affective* strategies were not perfectly normal, compared to theoretical bell-shaped normal probability distributions, they were sufficiently close to normality to justify the use of parametric statistics.

Outliers. Outliers (i.e., extremely large or small values, reflecting unusual cases that are not representative of the sample) cause more bias in parametric statistics than departures from normality. Because the computational formulae of MANOVA are based upon sums of squares, outliers may distort inferences (Hair et al., 2010; Huberty and Olejnik, 2006). Univariate outliers were identified in this study by computing the *Z* scores (i.e., the number of standard deviations each dependent variable was away from its corresponding mean value). No outliers, with *Z* scores outside the expected normal limits of ± 3.3 (Tabachnik and Fidell, 2007) were identified in *approach, communication, metacognitive,* and *affective* (see Table 5).

	Variables					
Kolmogorov-Smirnov test	**Affective**	**Approach**	**Cognitive**	**Communication**	**Metacognitive**	**Social**
n	120	120	120	120	120	120
K-S	1.486	1.375	1.850	.802	.493	2.763
p	.024	.046	.002	.541	968	<.001*

Note: * Significant deviation from normality at $\alpha = .001$

Table 4: Tests for normality of six dependent variables



Note: APP = approach; COM = communication; COG = cognitive; METACOG = metacognitive; SOC = social; AFF = affective

Figure 2: Frequency distribution histograms of the dependent variables

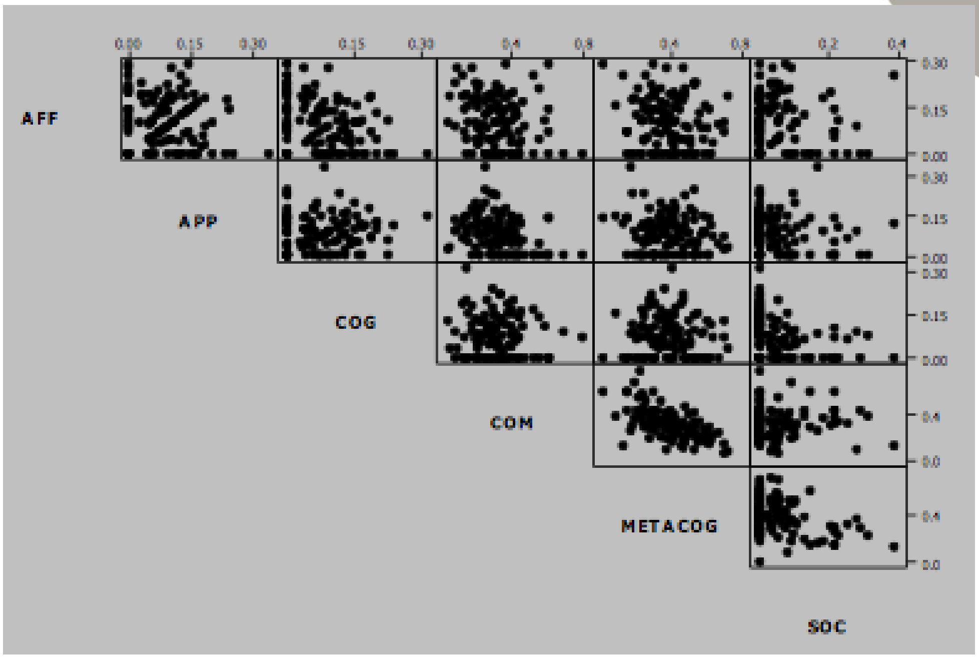
The *cognitive* strategy variable, with a maximum *Z* score of 3.312, which is just at the margin of the limits, was considered acceptable to conduct MANOVA, and, as such, it was included in the analysis. (Note that slight deviations from normality with respect to ANOVA should have no effect on the results; in other words, the statistical inferences remain robust in the face of such a slight deviation from normality [refer to Hair et al. 2010]).

Previous simulation studies using various non-normal distributions have indicated that "the false positive rate is not affected very much by the violation of the assumption" (McDonald, 2009, pp 150-154).) One clear positive outlier with a *Z* score of 4.156 was found, however, in *social*, indicating that the *social* strategy variable should be excluded from the analysis.

Variable	**Minimum** ***Z* score**	**Maximum** ***Z* score**
Affective	-1.248	2.290
Approach	-1.238	3.291
Cognitive	-1.121	3.312
Communication	-2.048	3.271
Metacognitive	-2.721	2.374
Social	-.667	4.156

Table 5: Test results for outliers

Inter-correlation between dependent variables. The multiple dependent variables in a MANOVA model, in theory, should be multi-collinear (i.e., inter-correlated with each other). A matrix plot (Figure 3) fitted with linear (simple linear regression) trend lines depicts the linear relationships between the six variables (*affective*, *approach*, *cognitive*, *communication*, *metacognitive* and *social*). Seven significant ($p < .05$) Pearson's correlation coefficients ($r = -.169$ to $r = -.617$) confirmed that the variables justifiably could be combined for the purposes of MANOVA (see Table 6).



Note: AFF = affective; APP = approach; COG = cognitive; COM = communication; METACOG = metacognitive; SOC = social

Figure 3: Matrix plot between six dependent variables

Variable	Affective	Approach	Cognitive	Communication	Metacognitive	Social
Affective	1					
Approach	-.115	1				
Cognitive	-.336*	.063	1			
Communication	-.203*	-.325**	-.088	1		
Metacognitive	-.169*	-.108	-.064	-.617*	1	
Social	-.036	-.126	-.352*	.023	-.350*	1

Note: Significant at ** = .01; * *α* = .05

Table 6: Matrix of correlation coefficients between six dependent variables (N = 40)

Sphericity. The repeated measures of each dependent variable in MANOVA, theoretically, should not depart from sphericity; that is, the variances of the differences between the repeated measures (i.e., the three tasks) should be homogeneous. Departures from sphericity were tested using Mauchly's test (see Table 7) at $\alpha = .001$. None of the dependent variables departed from sphericity, apart from the *social* strategy variable (Mauchly's $W = .625$, $p < .001$), indicating that the *social* strategy variable should be excluded from the MANOVA model.

Including the *social* strategy variable				Excluding the *social* strategy variable		
Variable	**Mauchly's *W***	***df***	***p***	**Mauchly's *W***	***df***	***p***
Affective	.951	2	.413	.962	2	.497
Approach	.764	2	.009	.765	2	.008
Cognitive	.776	2	.012	.843	2	.046
Communication	.946	2	.379	.959	2	.472
Metacognitive	.971	2	.596	.972	2	.601
Social	.227	2	<.001*			

Note: * Significant at *α* = .001

Table 7: Test for sphericity of within-subject effects

Homogeneity of variance. The variances of each dependent variable in MANOVA theoretically should be homogeneous (i.e., variances are equal) across the groups, identified using Levene's test. Only one measure, *cognitive* (*task 1*), marginally violated the assumption of homogeneity of variance at *α* = .05, indicated by *p* = .046 for the Levene's *F* statistic (Table 8).

Variable	**Levene's *F***	***df*1**	***df*2**	***p***
Affective (Task 1)	2.175	3	36	.108
Affective (Task 2)	1.835	3	36	.158
Affective (Task 3)	.709	3	36	.553
Approach (Task 1)	.355	3	36	.786
Approach (Task 2)	1.902	3	36	.147
Approach (Task 3)	.537	3	36	.660
Cognitive (Task 1)	2.948	3	36	.046*
Cognitive (Task 2)	1.968	3	36	.136
Cognitive (Task 3)	.208	3	36	.890
Communication (Task 1)	.005	3	36	1.000
Communication (Task 2)	.215	3	36	.885
Communication (Task 3)	.617	3	36	.609
Metacognitive (Task 1)	1.006	3	36	.401
Metacognitive (Task 2)	1.395	3	36	.260
Metacognitive (Task 3)	.434	3	36	.730
Social (Task 1)	.833	3	36	.485[a]
Social (Task 2)	.722	3	36	.546[a]
Social (Task 3)	2.783	3	36	.055[a]

Note: * Statistically significant at *α* = .05. [a] *Social* strategy variable was included in Levene's test, but not in MANOVA.

Table 8: Levene's test for homogeneity of variance (N = 40)

4 RESULTS

This section first reports the descriptive statistics for guiding question 1 (Section 4.1), followed by the results from the mixed model MANOVA to address the remaining guiding questions (Section 4.2). It is important to note that the questions are addressed in multivariate terms, i.e., under the premise that all variables operated and interacted simultaneously, in combination, and not separately.

4.1 Strategic behaviours

The frequencies of the individual strategies that participants used were analysed by strategy category. Overall, participants used 90 different individual strategies across all tasks (see Table 9). The total number of instances of individual strategies across all tasks and participants was 2454.

Individual strategy	**Total**	***M***	**Range**	***SD***	**% in relation to strategy category**	**% in relation to total number of strategy used**
Approach						
Developing reasons	105	2.62	8	2.059	48.61%	4.28%
Generating choices	9	.23	1	.423	4.17%	0.37%
Generating ideas	66	1.65	7	1.442	30.56%	2.69%
Identifying task format	4	.10	2	.379	1.85%	0.16%
Identifying task purpose	10	.25	3	.588	4.63%	0.41%
Making choices	8	.20	1	.405	3.70%	0.33%
Recalling questions	9	.23	3	.577	4.17%	0.37%
Recalling what one has said	5	.13	2	.404	2.31%	0.20%
Communication						
Abandoning	9	.23	2	.480	1.26%	0.37%
Approximating	12	.30	2	.516	1.68%	0.49%
Avoiding	9	.22	2	.480	1.26%	0.37%
Borrowing	5	.13	1	.335	0.70%	0.20%
Code-switching	2	.05	1	.221	0.28%	0.08%
Coining words	2	.05	2	.316	0.28%	0.08%
Elaborating to clarify meaning	42	1.05	4	1.037	5.87%	1.71%
Elaborating to fill time	29	.72	2	.679	4.06%	1.18%
Elaborating to meet requirements	25	.63	2	.740	3.50%	1.02%
Guessing	5	.13	1	.335	0.70%	0.20%
Linking	240	6.00	9	1.867	33.57%	9.78%
Paraphrasing	36	.90	4	1.057	5.03%	1.47%
Pausing to formulate speech	43	1.08	4	1.228	6.01%	1.75%
Pausing to generate ideas/solutions	50	1.2	5	1.324	6.99%	2.04%
Pausing to make choices	5	.13	1	.335	0.70%	0.20%
Referring to notes	10	.25	1	.439	1.40%	0.41%
Referring to questions	7	.18	1	.385	0.98%	0.29%
Repeating	10	.25	2	.494	1.40%	0.41%
Restarting	68	1.7	8	1.964	9.51%	2.77%
Reviewing notes	1	.02	1	.158	0.14%	0.04%
Simplifying	16	.15	2	.427	2.24%	0.65%
Slowing down	7	.18	2	.446	0.98%	0.29%
Spelling out to clarify meaning	1	.02	1	.158	0.14%	0.04%
Spelling to ensure comprehension	1	.02	1	.158	0.14%	0.04%
Stalling to fill time	25	.32	1	.423	3.50%	1.02%
Thinking ahead	2	.05	1	.221	0.28%	0.08%
Using keywords	3	.08	1	.267	0.42%	0.12%
Using L1	48	1.18	3	1.059	6.71%	1.96%
Using L2 to organise thoughts	2	.05	1	.221	0.28%	0.08%

Individual strategy	Total	*M*	Range	*SD*	% in relation to strategy category	% in relation to total number of strategy used
Cognitive						
Analysing linguistic choices	2	.05	1	.221	1.02%	0.08%
Analysing questions	8	.20	1	.405	4.08%	0.33%
Anticipating examiner's feedback	3	.08	1	.267	1.53%	0.12%
Anticipating problems	3	.08	1	.267	1.53%	0.12%
Anticipating questions	4	.10	1	.304	2.55%	0.20%
Anticipating rating criteria	4	.10	1	.304	2.04%	0.16%
Attending to oral production	7	.18	2	.446	3.57%	0.29%
Attending to task requirements	17	.22	2	.446	8.67%	0.70%
Using imagination	5	.13	1	.335	2.55%	0.20%
Inferring	6	.15	2	.427	3.06%	0.24%
Memorising	2	.05	1	.221	1.02%	0.08%
Organising thoughts	50	1.25	4	1.080	25.51%	2.04%
Outlining	4	.10	2	.379	2.04%	0.16%
Recalling vocabulary	1	.03	1	.158	0.51%	0.04%
Recalling what one has written	3	.08	1	.267	1.53%	0.12%
Translating	39	.98	3	.974	19.90%	1.59%
Using intuition	3	.03	1	.158	1.53%	0.12%
Using mechanical means	34	.85	3	.700	17.35%	1.39%
Individual strategy	**Total**	***M***	**Range**	***SD***	**% in relation to strategy category**	**% in relation to total number of strategy used**
Metacognitive						
Evaluating language skills	25	.63	3	.807	2.69%	1.02%
Evaluating language production	79	1.98	5	1.387	8.50%	3.22%
Evaluating mental process	9	.23	2	.530	0.97%	0.37%
Evaluating performance	168	4.2	10	2.151	18.08%	6.85%
Evaluating strategies	7	.18	1	.385	0.75%	0.29%
Evaluating task	100	2.5	5	1.377	10.76%	4.07%
Evaluating what one has heard	81	2.03	5	1.330	8.72%	3.30%
Evaluating affect	54	1.35	4	1.210	5.81%	2.20%
Generating goals	8	.20	3	.608	0.86%	0.33%
Generating future solutions	17	.43	4	.813	1.83%	0.69%
Generating future strategies	50	1.25	10	1.765	5.38%	2.04%
Setting goals	122	3.05	15	2.819	13.13%	4.97%
Identifying problems	49	1.22	6	1.423	5.27%	2.00%
Monitoring examiner's/teacher's feedback	10	.18	2	.501	1.07%	0.41%
Monitoring time	14	.35	2	.580	1.51%	0.57%
Planning	33	.83	2	.844	3.55%	1.34%
Self-monitoring	28	.70	3	.911	3.01%	1.14%
Self-correcting	75	1.87	7	1.800	8.07%	3.06%
Social						
Asking examiner questions to direct conversation	1	.02	1	.158	0.85%	0.04%
Asking examiner questions to engage the examiner	2	.05	1	.221	1.71%	0.08%
Attending to the listener's interest	7	.28	2	.446	5.98%	0.29%
Create a positive impression	2	.05	1	.221	1.71%	0.08%
Using examiner's feedback in one's response	8	.20	1	.405	6.84%	0.33%
Seeking clarification	88	2.20	7	1.728	75.21%	3.59%
Seeking examiner's feedback	6	.15	1	.362	5.13%	0.24%
Seeking help	1	.02	1	.158	0.85%	0.04%
Seeking social interaction	2	.05	1	.221	1.71%	0.08%
Affective						
Asking questions to lower anxiety	1	.02	1	.158	0.36%	0.04%
Fearing judgement	1	.02	1	.158	0.36%	0.04%
Justifying affective state	31	.78	6	1.459	11.03%	1.26%
Justifying performance	163	4.08	9	2.411	58.01%	6.64%
Lowering anxiety	51	1.28	5	1.198	18.15%	2.08%
Monitoring affective state	14	0.35	3	.736	4.98%	0.57%
Overriding affective challenges	9	0.23	3	.620	3.20%	0.37%
Engaging in positive self-talk	12	0.28	2	.599	3.91%	0.45%

Table 9: Frequencies and percentages of strategy use for all three tasks combined *(N = 40 for all strategies)*

As Table 9 shows, the individual strategy with the highest percentage in each category were *developing reasons* (approach; 48.6%), *linking* (communication; 33.6%), *organising thoughts* (cognitive; 25.5%), *evaluating performance* (metacognitive; 18.1%), *seeking clarification* (social; 75.2%), and *justifying performance* (affective; 58%). Overall, the top-10 individual strategies were as follows.

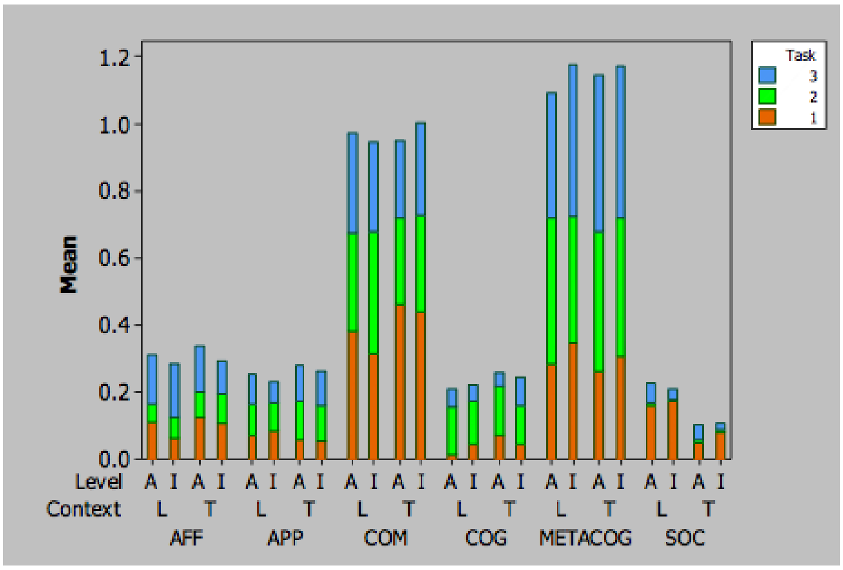
1. Communication: *Linking to prior experiences/knowledge* (9.78%)
2. Metacognitive: *Evaluating performance* (6.85%)
3. Affective: *Justifying performance* (6.64%)
4. Metacognitive: *Setting goals* (4.97%)
5. Approach: *Developing reasons* (4.28%)
6. Metacognitive: *Evaluating tasks* (4.07%)
7. Social: *Seeking clarification* (3.59%)
8. Metacognitive: *Evaluating what one has heard* (3.30%)
9. Metacognitive: *Evaluating language production* (3.22%)
10. Metacognitive: *Self-correcting* (3.06%)

Among the above individual strategies, six were in the *metacognitive* strategy category and one each was in the categories of *communication*, *affective*, *approach*, and *social*. Overall, the *metacognitive* strategy category represents 37.86% of all individual strategy used, followed by *communication* (29.14%), *affective* (11.45%), *approach* (8.80%), *cognitive* (7.99%), and *social* (4.77%).

Results from examining the relationships among the strategy categories, as shown in Table 6 above, indicated that the only significant relationships were negative and occurred in seven cases with different degrees of magnitude: the *affective* category was significantly negatively correlated with *cognitive* (r = -.366, p < .05), *communication* (r = -.203, p < .05), and *metacognitive* (r = -.169, p < .05); and the *approach* category was significantly negatively correlated with *communication* (r = -.325, p < .001), as were *cognitive* and *social* (r = -.352, p < .05), *communication* and *metacognitive* (r = -.617, p < .05), and *metacognitive* and *social* categories (r = -.350, p < .05). These negative and significant correlations suggest that, for example, participants who reported more *affective* strategies tended to report fewer *cognitive*, *communication*, and *metacognitive* strategies, and vice versa. Participants who reported more *approach* strategies tended to report fewer *communication* strategies, and vice versa. The same tendency applied to the relative use between *cognitive* and *social*, between *communication* and *metacognitive*, and between *metacognitive* and *social* strategies.

The descriptive statistics computed for the arcsine-transformed strategy-use scores, stratified by *context*, *level*, and *task*, are presented in Appendix 2a. Figure 4 below is a clustered and stacked bar chart to visualise and compare the means.

As with the results from the raw frequency counts, the arcsine-transformed means also indicated that the highest overall mean scores representing the highest proportional strategy use across the three tasks and two factors were for *metacognitive* (M = .383, SD = .140), followed by *communication* (M = .322, SD = .132). Lower mean scores were recorded for *affective* (M = .102, SD = .081), *approach* (M = .085, SD = .069), and *cognitive* (M = .077, SD = .069). The lowest mean scores, representing the least-proportional strategy use, was for *social* (M = .052, SD = .079). (The descriptive statistics for non-arcsine-transformed strategy-use scores, stratified by *context*, *level*, and *task*, are also presented in Appendix 2b.)



Note: AFF = affective;
APP = approach;
COM = communication;
COG = cognitive;
METACOG = metacognitive;
SOC = social;
A = advanced;
I = intermediate;
L = non-testing;
T = testing

Figure 4: Comparison of mean (arcsine-transformed) scores for the use of strategies

4.2 Multivariate effects

Based on the results from the diagnostic tests described in Section 3.5.5, apart from the *social* strategy variable, data for the participants' reported and observed strategy use did not strongly violate the theoretical assumptions of MANOVA. Elimination of outliers and transformation using √X or log (X+1) did not normalise the *social* strategy variable, because of the low frequency of usage. The effects of *task*, *context*, and *performance level* on a linear combination of the five dependent variables (excluding the *social* strategy variable) with interaction effects was therefore determined using MANOVA. (Interaction reflects the effects of two or more factors acting in combination rather than alone. Significant interaction implied that participants' strategies diverged in a non-parallel fashion with respect to the different levels of each factor.)

The *general linear model procedure with repeated measures* option was selected in SPSS, using the methods described by Field (2009) to compute the multivariate MANOVA statistics (Wilks' λ, Hotelling's T-Square, Pillai's trace and Roy's largest root and *F*) for the between-subjects effects (i.e., across the two contexts and two proficiency levels) and the within-subjects effects (i.e., across the three tasks). (Note that Wilks' λ was interpreted in this study, because it is the most commonly used MANOVA statistic and is generally applied when there are more than two groups. Hotelling's trace is used only to compare two groups. Pillai's trace is the most conservative, whereas Roy's largest root is the least conservative MANOVA statistic [refer to Huberty and Olejnik, 2006].) Interaction terms were included only if they were significant at $\alpha = .05$. The results are presented in Table 10.

The decision rule was to reject the null hypothesis of no significant between-subjects or within-subjects effect if $p < .05$ for Wilks' λ. Using this decision rule, the results showed that the between-subjects effects were statistically significant for *context* (Wilks' λ (10, 33) = .645, $p = .010$), with a moderate effect size ($\eta^2 = .355$). The between-subjects effects were not statistically significant for *level* (Wilks' λ (10, 33) = .970, $p = .958$), with a negligible effect size ($\eta^2 = .030$). *Task* had a significant within-subjects effect (Wilks' λ (10, 28) = .156, $p < .001$), with a large effect size ($\eta^2 = .844$). There was, however, a significant interaction between *task* and *context* (Wilks' λ (10, 28) = .449, $p = .005$), with a moderate effect size ($\eta^2 = .551$).

4.2.1 Between-subjects effects

The null hypothesis of no significant between-subjects effects was not rejected, indicated by $p > .05$ for the *F* statistic (Table 11). The between-subjects effects were, however, confounded by the interaction of *task* x *context*.

Effect		Wilk's *λ*	Hypothesis *df*	Error *df*	*p*	η^2
Between-subjects	Context	.645	5	33	.010*	.355
	Level	.970	5	33	.958	.030
Within-subjects	Task	.156	10	28	<.001*	.844
	Task x Context	.449	10	28	.005*	.551

Note: * Significant at *α* = .05

Table 10: Multivariate statistics

Source	Measure	*df*	*F*	*p*	η^2
Context	Affective	1	.100	.754	.003
	Approach	1	.601	.443	.016
	Cognitive	1	1.201	.280	.031
	Communication	1	.061	.807	.002
	Metacognitive	1	.095	.760	.003
Level	Affective	1	.469	.498	.013
	Approach	1	.278	.601	.007
	Cognitive	1	.001	.976	.000
	Communication	1	.030	.862	.001
	Metacognitive	1	.455	.504	.012

Note: * Significant at *α* = .05

Table 11: Between-subjects effects

4.2.2 Within-subjects effects

The null hypothesis of no significant within-subjects effects was tested assuming a linear model (Table 12). The effects of the three tasks on reported strategy use were statistically significant with respect to *affective*, *communication* and *metacognitive* variables, indicated by $p < .05$ for the F statistics, with small to moderate effects sizes ($\eta^2 = .128$, .413, and .459, respectively). The main effects were confounded by significant interactions at $\alpha = .05$ of *task* x *context* with respect to *affective* and *communication* variables.

Overall, these results indicated that (a) a linear combination of the scores for strategy use differed significantly between the testing and non-testing contexts, but not between the intermediate and advanced proficiency levels; (b) a linear combination of the scores varied significantly across the three tasks; and (c) there was an interaction between *task* and *context*. (Note: A preliminary analysis using untransformed raw frequency counts indicated no significant interactions, so that the interaction terms could be excluded from the model. A significant *task* x *context* interaction was found using the arcsine-transformed data, however; therefore, the interaction terms were included in the within-subjects and between-subjects effects.)

The *task* x *context* interactions between the mean strategy use scores for *affective*, *approach*, *cognitive*, *communication*, and *metacognitive* are displayed using interaction plots in Figure 5 on the following page. The interactions were disordinal, i.e., the two lines representing the change in the mean values of the testing group and the non-testing group across the three tasks were not parallel, but tended to cross each other. The mean scores did not change systematically (e.g., increase, decrease, or stay the same) across task 1, task 2, and task 3 for each category of strategy use. The significant interaction for the *affective* variable was reflected by an increase in scores between task 2 and task 3 for the non-testing group, which was not paralleled by the testing group. The significant interaction for the *communication* variable was reflected by a significant decline in the scores among tasks 1, 2, and 3 in the testing group, which was not paralleled by the non-testing group.

Statistically, the testing and the non-testing groups' usage of strategies across the three tasks were not parallel. Figure 5 further illustrates that task 1 tended to elicit low use of *cognitive* and *metacognitive* strategies, but higher usage of *affective* and *communication* strategies for members of the testing group. Task 2 is generally associated with a higher usage of *approach*, *cognitive*, and *metacognitive* strategies, with both groups exhibiting similar usage in the *cognitive* and *metacognitive* strategies. Task 3 tended to be associated with a lower usage of *communication* and *cognitive* strategies for both groups, and with a higher usage of *approach* and *metacognitive* strategies for the testing group and *affective* strategies for the non-testing group.

Table 13 provides a list of the top-five individual strategies that had the highest mean for each task. The strategies unique to each task in each context are highlighted in bold. In terms of the top-five individual strategies, the strategies that participants used to perform the three tasks in the testing and non-testing contexts are similar. *Linking* (communication strategy) and *evaluating performance* (metacognitive strategy) are two common top-five individual strategies that the participants used in both testing and non-testing contexts to perform all three tasks. The use of *restarting* to ensure and demonstrate correctness of utterances is unique to the testing situation. Also noted is the fact that none of these individual strategies belong to so-called non-construct-related, test-wiseness strategies, which test developers aim to avoid (Cohen, 2012). As also pointed out by Cohen (forthcoming), "[T]est-wiseness strategies are best applied to the former two types of items [i.e., listening and reading tasks] and not to the latter [i.e., speaking and writing tasks]."

Source	Measure	*df*	*F*	*p*	η^2
Task	Affective	1	5.445	.025*	.128
	Approach	1	2.399	.130	.061
	Cognitive	1	1.430	.239	.037
	Communication	1	26.028	<.001*	.413
	Metacognitive	1	31.436	<.001*	.459
Task x Context	Affective	1	4.688	.037*	.112
	Approach	1	2.743	.106	.069
	Cognitive	1	.861	.359	.023
	Communication	1	6.668	.014*	.153
	Metacognitive	1	2.628	.114	.066

Note: * Significant at $\alpha = .05$

Table 12: Within-subjects effects

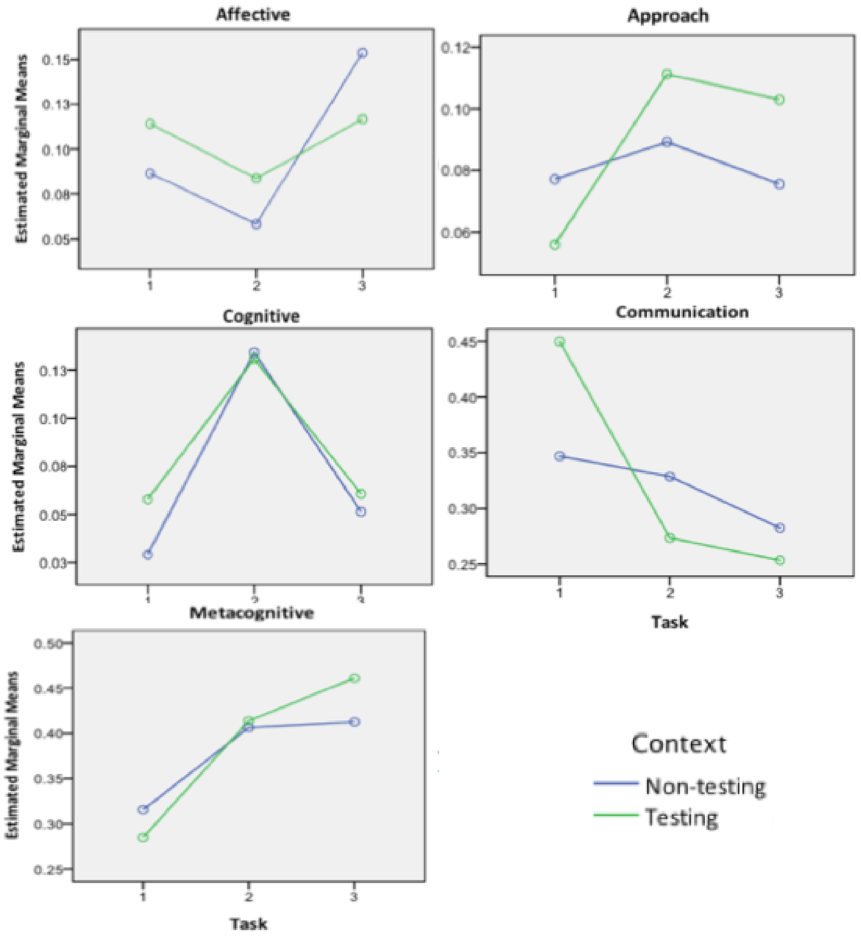


Figure 5: Interaction plots

Task	Individual strategies		
	Non-testing	Testing	Overall
1	Seeking clarification (Soc) Linking (Com) Evaluating performance (Meta) Justifying performance (Aff) Evaluating task (Meta)	Linking (Com) Evaluating performance (Meta) Restarting (Com) Seek clarification (Soc) Justifying performance (Aff)	Linking (Com) Evaluating performance (Meta) Justifying performance (Aff) Setting goal (Meta) Developing reasons (App)
2	Linking (Com) Evaluating performance (Meta) Organising thoughts (Cog) Justifying performance (Aff) Setting goal (Meta)	Evaluating task (Meta) Linking (Com) Justifying performance (Aff) Setting goal (Meta) Developing reasons (App)	Linking (Com) Seeking clarification (Soc) Evaluating performance (Meta) Justifying performance (Aff) Evaluating task (Meta)
3	Justifying performance (Aff) Evaluating performance (Meta) Linking (Com) Evaluating task (Meta) Setting goal (Meta)	Evaluating performance (Meta) Setting goal (Meta) Linking (Com) Developing reasons (App) Evaluating task (Meta)	Evaluating performance (Meta) Justifying performance (Aff) Linking (Com) Setting goal (Meta) Evaluating task (Meta)

Note: AFF = affective; APP = approach; COG = cognitive; COM = communication; METACOG = metacognitive; SOC = social; A = advanced; I = intermediate.

Table 13: Top-five individual strategies by task

5 SUMMARY AND DISCUSSIONS

5.1 Summary of results

This section first presents a summary of the findings according to each of the guiding research questions presented in Section 3.1. It is important to stress that the questions were addressed using multivariate analyses, as previously demonstrated, and, although the questions are presented separately in this section for readability, the guiding questions are inter-connected and related, and thus individual questions should not be considered as separate entities. Following the summary, the study's empirical and methodological implications are discussed.

5.1.1 Guiding question 1

Strategic behaviours: When participants perform the IELTS speaking tasks, what strategic behaviours do they report that they employ to regulate their cognitive processes in testing and non-testing situations?

Participants reported that they used all six strategies (approach, cognitive, communication, metacognitive, affective, and social) in both testing and non-testing contexts. Social strategies was the least-used strategy type, skewing the frequency distribution to the right and causing a strong deviation from normality; therefore, it was excluded from subsequent parametric statistical analysis. The scores for the other five strategies were found to be normally distributed, based on a conservative .001 level of significance for the Kolmogorov-Smirnov test, and no outliers were identified. These scores for strategy use did not strongly violate the assumptions of MANOVA.

Overall, participants used 90 different individual strategies across all tasks (see Table 9). The *metacognitive* strategy category represents 37.86% of all individual strategies used, followed by *communication* (29.14%), *affective* (11.45%), *approach* (8.80%), *cognitive* (7.99%), and *social* (4.77%). Similar to findings generated from previous studies examining test-takers' strategic behaviours in performing speaking tasks (e.g., Swain et al., 2009), *metacognitive* and *communication* strategies were the top two strategy categories, with similar usage in proportion to the participants' total strategy use. Whereas *affective* strategies have been among the least-reported strategies in the SLA literature (Huang, 2012; Oxford, 2011), in this study, these strategies were the third-most frequently used. *Cognitive* strategies, which, along with *communication* and *metacognitive* strategies have been prominent in previous research in both SLA and LT fields, as described in Section 2.3, were used less frequently by participants performing IELTS speaking tasks. The use of *social* strategies is unique to the present study because of the nature of the tasks involved in the first and third IELTS speaking tasks. Within each strategy category, the most frequently used individual strategies are similar to the ones identified in the previous study, with the exception that the *social* strategy is unique to the present study. In line with the results from the overall usage of the six categories of strategies, among the top-10 individual strategies used by the participants, there was a similar use of *metacognitive* strategies in *setting goals* and *evaluating performance and oral production* and *communication* strategy in *linking to previous experiences/knowledge* in order to respond.

5.1.2 Guiding question 2

Strategic behaviours vis-à-vis contexts: Is there a difference in participants' reported strategic behaviours between testing and non-testing situations?

The MANOVA null hypothesis that there was no significant difference between the participants' reported strategy use in a testing situation compared with a non-testing situation was rejected. This means that the testing and non-testing groups used significantly different strategies. Because disordinal interactions were identified (i.e., the two lines representing the change in the mean values of the testing group and the non-testing group across the three tasks were not parallel), the main effects of context on strategy use could not be easily interpreted, because the effects of context depended on the task. This important finding underscores the reality that simple associations between strategy use and second-language performance commonly suggested in the literature largely ignore the complex nature of the interrelationships among variables. This complexity warrants further empirical investigation because it has serious implications for test validity.

5.1.3 Guiding question 3

Strategic behaviours vis-à-vis proficiency levels: When participants perform the IELTS speaking tasks, are there differences in their reported strategy use between advanced vs. intermediate participant groups in testing and non-testing situations?

The MANOVA null hypothesis that there was no significant difference between the participants' reported strategy use at an advanced proficiency level compared to that at an intermediate proficiency level was not rejected. This means that the strategies reported by the participants at the two proficiency levels did not differ significantly. This finding supports previous studies indicating that strategy use may not be related to language performance in the testing context in a simplistic, direct way (e.g., Purpura, 1999; Swain et al., 2009) and is also in line with growing evidence in the language-learning context that disputes the commonly-held perception derived from early good-language-learners studies that more efficient learners use more strategies or that the more strategies a learner can employ the better. What matters for individual learners, rather, is successfully managing a repertoire of strategies that work in various contexts in response to specific tasks. It is important to note, however, that absence of statistical significance is not evidence for absence (Alderson, 2004). It is possible that the finding of no significant difference could be the result of an accident in sampling that may have happened because the sample was not large enough to achieve sufficient power.

5.1.4 Guiding question 4

Strategic behaviours vis-à-vis tasks: Are there differences in reported strategy use in performing the three IELTS speaking tasks in testing and non-testing situations?

The MANOVA null hypothesis that there was no significant difference between the participants' reported strategy use across three tasks was rejected. This means that the mean strategy-use scores reported by participants for the use of the five strategies tended to fluctuate up and down between task 1 and task 3, explaining why there were significant within-subjects effects in the MANOVA model. Significant disordinal interactions were found between *task* and *context* with respect to the *affective* and *communication* strategies. This is an important finding, because when interactions between factors are statistically significant, then the results of a mixed-model MANOVA are difficult to interpret, because the interactions confound the description and interpretation of the main (between-subjects and within-subjects) effects associated with each factor (Hair et al., 2010). Given the type and nature of the IELTS speaking tasks, which involve both monologues and dialogues across the three tasks, it is understandable that *affective* and *communication* strategies stood out because they can be used differently across tasks between the two contexts. More importantly, the finding indicates that further research is needed to examine test-takers'/learners' patterns of strategy use for the same and different tasks on multiple occasions.

5.1.5 Guiding question 5

Strategy use vis-à-vis oral production: What are the relationships between participants' reported and observed strategy use in testing and non-testing situations and their oral-language production scores?

The results showed that, overall, there was no difference in participants' oral-language production, as measured by their IELTS speaking scores between the testing (M = 6.35, SD = 0.51) and non-testing (M = 6.37, SD = 0.55) groups. Results from the repeated measures ANOVA also showed that there was no significant difference between the scores for the two sets of ratings (p = .213) and there was no interaction (p = .933). Excluding the interaction also resulted in the value of p = .207 (refer to Appendix 3 for the results of the repeated-measures ANOVA on rater scores).

It is important to point out again that this guiding research question was addressed in the preceding research questions through the examination of whether there were meaningful multivariate relationships among a set of variables. A simple bivariate correlation matrix, which was the basis for how this guiding question was originally phrased following how research questions have been predominantly phrased in the field, tends to be full of errors (e.g., Baron and Kenny, 1986; Edwards and Lambert, 2007). (Note: the results generated in the study from the correlational analyses between strategy use [by category and by individual strategies] and oral-language production scores by *proficiency level* and *context* showed that all the *p* values were greater than .05.) The simple bivariate correlation matrix was judged as inappropriate to evaluate the relationships between the strategy use mediated and/or moderated by the key variables (i.e., *context*, *proficiency*, and *task*) for two main reasons.

First, a correlation matrix suffers from Type I errors caused by random chance, leading to meaningless conclusions about the relationships between variables. If one constructs a 5 x 5 matrix, containing 25 correlation coefficients, then the chance of making a Type I error (i.e., declaring a statistically significant correlation at $\alpha = .05$, when there is, in fact, no significant relationship) is $1 - (1-.05)^{25} = .722$; that is, nearly 3 out of 4 of the correlations will be statistically significant because of random chance, and not because there is a meaningful relationship between or among the variables (Duffy, 2010).

Second, many of the bivariate correlations between two variables in a correlation matrix are the result of partial correlation, otherwise known as spurious correlation (e.g., Haig, 2003). Spurious correlation between two variables occurs if they are jointly correlated with a third variable, known as a controlling or mediating variable. If the effects of the third variable are controlled/removed, then there is no correlation between the first two variables. Alternatively, the third variable may not be a controlling variable, but a mediating variable (i.e., it alters the strength and/or direction of the correlation between the first two variables).

5.2 Empirical implications

The examination of learners' strategic behaviours and their strategy use in relation to *context*, *proficiency*, and *task* may have the following empirical implications:

1. Learners' strategic behaviours are phenomena that are clearly present in learners' speaking performance, as elicited through their stimulated recalls and observed in their oral-production data. The ways in which the use of those strategies interacts with multi-faceted individual (e.g., proficiency levels), task (e.g., task types), and contextual (e.g., the situation in which learners perform the task) variables point to the need for a re-evaluation of the theoretical basis and the limitations of methods used to study learners' strategic behaviours in the literature. The crucial next step forward is to draw insights from the model of cognition in cognitive psychology and of the hierarchical brain structure in neuroscience to propose a theoretical framework that maps behavioural, psychological, and neural processes (e.g., Flavell, 1979; Nelson and Naren, 1990; Shallice and Burgess, 1996; Shimamura, 2008).

2. Evidence relevant to the test's cognitive validity, as indicated by the results regarding participants' strategic behaviours elicited under testing and non-testing situations, is compelling and merits further investigation. With the exception of *social*

strategies, overall, members of the non-testing group generally used fewer strategies across the five strategy categories than members of the testing group (Appendices 2a and 2b). The between-subjects effects also were statistically significant for *context* (Table 10).

This preliminary finding underscores the key focus of this study in understanding whether the IELTS Speaking Test elicits behaviours not normally engaged in by learners in non-testing situations. One may argue that, although all participants from the testing group were asked and reminded to perform the speaking tasks as if their admission to a university depended on their scores rated by the certified IELTS examiner and all participants from the non-testing group were instructed to perform the tasks as if they were practicing them with an instructor in a normal classroom learning situation, the fact that testing-group members' performance had no real consequence for them, and that practicing the IELTS speaking tasks with the instructor, who is also an IELTS-certified examiner, might have triggered test-taking-like feelings or behaviours for the non-testing group, might have generated different speaking scores and/or elicited different strategic behaviours than those that would have occurred in each context in real life. One could also argue, however, that it is simply not possible to gather test-takers'/learners' strategic behaviours while implementing both conditions in a "real" testing or learning situation, and, that to the greatest extent possible, both conditions were implemented to maximise the simulation of the respective conditions. Since this is the first study to examine learners' strategic behaviours in simulated testing and non-testing contexts, further research is needed to verify these findings that have important implications in the development and validation of the IELTS Speaking Test.

3. The evidence for strategic competence as a component interacting with other components of communicative competence was not empirically substantiated by the results, which indicated that participants at intermediate and advanced proficiency levels, as measured by their oral-language production scores, did not differ significantly in their use of strategies to perform the IELTS speaking tasks. This finding is congruent with findings from previous research, although in a different high-stakes standardised testing context (Swain et al., 2009), which calls into question the strategic component of the communicative-competence framework put forward and modified by numerous researchers over the past four decades; there is still a lack of empirical evidence that substantiates its conceptualisation.

4. The examination of participants' strategic behaviours in performing the three speaking tasks suggested that there are both similarities and differences in the patterns and frequency of strategy use. The findings suggest that different *contexts* and *tasks* may trigger the deployment of different strategies. The picture of how the use of strategies is task dependent is a complex one, however, as evidenced by the significant interactions found between *task* and *context*. In addition to whether the context is testing or non-testing, other factors need to be considered to understand the finding in the present study concerning whether strategy use is task-specific, for example: (a) learning might have occurred, as a stimulated-recall session was implemented after each task and the tasks were administered in the same order to all participants based on the structure of the test, and counterbalancing the task order among the participant groups was not possible; and (b) learners' preference for using certain types of strategies may be manifested in the similarity of the types of strategy use across the tasks (e.g., Table 13). This study provides a clear indication that further research is needed to map out strategies against tasks in order to develop "a parsimonious framework" that can be applied to different contexts (Macaro, 2006, p 329). One way to accomplish this may involve having learners perform the same task on multiple occasions for all three tasks to ascertain the sequence, clusters, and quality/effectiveness of strategy use in performing particular task types.

5. This study is in line with the call by Cohen (forthcoming) for test constructors to be aware of what strategic behaviours a test item or task involves through the collection of verbal report data. The findings from the study clearly suggest that learners' strategy use is an important variable that comes into play in learners' test performance and that strategies are applicable to both testing and non-testing contexts. The findings that participants reported using a variety of strategies and that their strategy use differed significantly by *task* imply that learners' strategic behaviours are integral to performing IELTS speaking tasks, and, as such, the need to validate strategic behaviours as part of the construct of communicative performance is a valid concern. The evidence from this study does not point to respondents' use of test-wiseness strategies. An important step forward in determining whether a certain strategy is considered construct irrelevant in order to identify potential sources of invalidity in the measurements may not be as straightforward and simplistic as how the categorisation of testing-taking strategies, especially in the reading and speaking domains, is put forward in the literature. How the use of specific types of strategies can substantiate claims about the validity of inferences made based on the IELTS performance needs to be cross-checked with task designers' intent concerning the natural or desirable use of certain strategies in order to inform test-construction choices that can best assess the respondents' underlying speaking competence.

5.3 Methodological implications

In methodological terms, this study is the first to examine learners' strategic behaviours in both testing and non-testing contexts that points to further work in the oral construct with the provision of cognitive validity evidence. Several methodological implications that may provide the breakthroughs needed to validate the language ability models or communicative competence models within which strategic competence "plays . . . a central role" in communicating (Douglas, 1997, p 6), which, as pointed out previously, theorists in the field have proposed and recognised (e.g., Bachman, 1990; Bachman and Palmer, 1996; Canale and Swain, 1980; Chapelle and Douglas, 1993; Chapelle, Grabe and Berns, 1997; Douglas, 1997; Fulcher, 2003; Swain, 1985), must be considered.

1. Common criticisms and counter-arguments surrounding such issues as reactivity (e.g., in this case, the potential effects of drawing participants' attention to the cognitive processes underlying the tasks they engage in), individual participants' verbal reporting abilities (i.e., concerning the abilities participants use to verbalise their thought processes), and validity (i.e., whether the data accurately reflect learners' behaviours) have been extensively discussed in the literature (see e.g., Bowles, 2010; Ericsson and Simon, 1993; Young, 2005). With regard to the first issue, although the respondents may be more critically engaged in or consciously aware of the process of performing a speaking task due to the stimulated recall, one may argue that the respondents "are still not capable of producing anything outside the scope of their current knowledge and abilities" (Young, 2005, p 24), which are what the test is designed to assess: the underlying competency. As for the second issue, no claim has ever been made that a complete picture of respondents' strategies behaviours can be obtained through the procedure regardless of their verbal reporting abilities. Measures were taken in this study, such as giving respondents the time needed to verbalise and the option to verbalise in whatever language comes naturally to them or that is most comfortable to them during the stimulated recall sessions. There is also the general consensus among researchers that a greater understanding of participants' thought processes and behaviours can be obtained through their verbalisation than through relying on researchers' observations alone when the participants work in silence.

For the issue of validity, unlike all work that has been conducted during the past four decades, this is the first study to examine learners' strategic behaviours from both post-task stimulated recall data and learners' oral production data that has moved beyond the collection of learners' strategic behaviours based on survey instruments, retrospective reflections, or stimulated recalls alone. This more thorough way to examine learners' strategic behaviours may have contributed findings that seem to differ from previous findings (e.g., Paribakht, 1985; Phatiki, 2003; Purpura, 1997, 1998; Nakatani, 2006). Construct validation is not a one-shot effort. Further replication is warranted to see whether the present study's results can be validated.

If further studies do not support how learners' strategic behaviours may differ according to proficiency levels, this lack of support will have important implications about the strategic component of the construct of oral communicative competence, which, thus far, researchers have not been able to substantiate through empirical evidence.

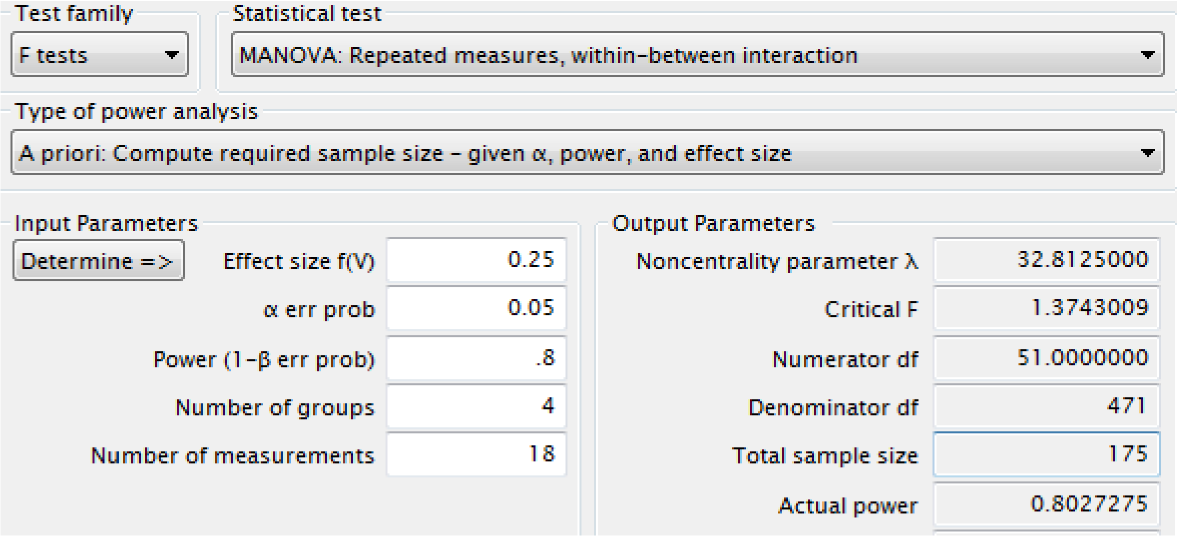
2. Along the line of methods used to elicit strategic behaviours, the use of rigorous stimulated recall sessions carried out immediately after each task is, as Macaro (2006) stated in his critical review of research on strategies for language learning and language use, a methodology for eliciting learner strategy use "at an acceptable level of validity and reliability" and can "effectively yield insights into skill-specific or task-specific strategy use" (p 321). This statement may have to be reconsidered, however. Although the stimulated-recall sessions were carried out in the language that participants felt most comfortable using (all 40 of them mainly used their first language, Chinese) to minimise possible interferences in the participants' thought/cognitive processes, advancements in neuroscience methodology, such as functional magnetic resonance imaging (fMRI), to study metacognitive ability, as well as the most cutting-edge studies in psychology and neuroscience to understand the neural substrates supporting cognitive performance in memory, perception, and decision making, have suggested that metacognitive accuracy is dissociable from task performance and may vary among individuals (e.g., Fleming, Weil, Nagy, Dolan and Rees, 2010; Fleming and Dolan, 2012; Fleming, Huijgen and Dolan, 2012) or not be congruent with self-reports (e.g., Falk, Berkman and Lieberman, 2012). The field of learner strategic behaviours has come to a critical juncture, and to move the field forward, interdisciplinary research must be pursued. The methods used to study learners' cognitive processes must incorporate data gathered from other sources to provide a fuller picture of learners' strategic behaviours and (re-)evaluate the validity of the research methods and the findings that have been generated during the past four decades. Such advances are likely to contribute to exciting developments and new perspectives in this crucial line of LT research.

3. Studies that attempt to examine learners' task-specific strategic behaviours that are elicited through non-questionnaire-based methods in relation to multiple key variables must reconsider the statistical procedures used to address research questions. In real-world circumstances, no variable operates in isolation. Even when performing a series of experiments with just one dependent variable and one independent variable in each study, given what is now known about the multi-faceted nature of contextual, instructor-related, and learner variables, asking univariate research questions and conducting multiple univariate inferential tests (e.g., *t*-test or univariate ANOVA) to address each of the research questions that are inter-related need to be reassessed for several reasons: (a) there is a highly elevated chance of making Type I errors (i.e., the more univariate inferential tests that researchers perform, the more chance there is that a statistically significant result will be generated by random chance); and (b) interactions using univariate statistics cannot be properly identified. Interactions are very important when the dependent variables (e.g., strategy use) are presumably influenced by multiple factors (e.g., *context*, *proficiency level*, and *task*). Presenting the results for each of the guiding research question assumes that each variable is a completely separate entity, which contradicts the reality of how variables operate in the real world. The dependent variables (strategy use) are inter-correlated with each other. The effects of each level of each factor (*context*, *proficiency*, and *task*) may interact with each other. This is particularly relevant in studies that attempt to validate a test's cognitive validity.

4. Because the statistical inferences of MANOVA might be compromised by the small sample size, future studies that involve a larger number of participants are urgently needed. A power analysis was performed using G*Power 3 software (Faul et al., 2007) to predict the absolute minimum total sample size. The input parameters were a moderate effect size (*f*(V) = .25 (i.e., 25% of the variance in the dependent variable is explained); *α* = .05 (i.e., a 5% chance of a Type I error); power = .8 (i.e., a 20% chance of a Type II error), four groups of participants, and 18 measurements (i.e., six dependent variables x three repeated measures). The output (Figure 6) predicted that the total sample size should be 175; the implication is that a minimum of 45 in each group is needed to achieve sufficient power to test the null hypotheses of MANOVA.

5. Insufficient power because of a small sample size did not warrant the computation of correlation coefficients or performing the complex analysis of moderation and mediation used in social-psychological research (e.g., Fairchild and MacKinnon, 2009) in order to explain the pathway by which variables are related (Rose, Holmbeck, Coakley and Franks, 2004). To correctly calculate a moderate Pearson correlation coefficient of .5 (assuming a null hypothesis of zero correlation), the sample size should be 29 (Figure 7). To correctly calculate a smaller correlation coefficient of .25, the sample size should be increased to 97.

Conducting a large-scale study is further warranted because the claim that studies with small sample sizes can produce reliable, significant outcomes has been recently challenged in other fields. Specifically, results generated in individual studies that subsequently produced significant effects in meta-analyses failed to reach significance in definitive large studies. These results point to the unreliability of conclusions in meta-analyses in which small numbers of non-significant studies are pooled to produce significant results (see e.g., Rerkasem and Rothwell, 2010)



Test family: F tests

Statistical test: MANOVA: Repeated measures, within-between interaction

Type of power analysis: A priori: Compute required sample size – given α, power, and effect size

Input Parameters

Effect size f(V): 0.25

α err prob: 0.05

Power (1-β err prob): .8

Number of groups: 4

Number of measurements: 18

Output Parameters

Noncentrality parameter λ: 32.8125000

Critical F: 1.3743009

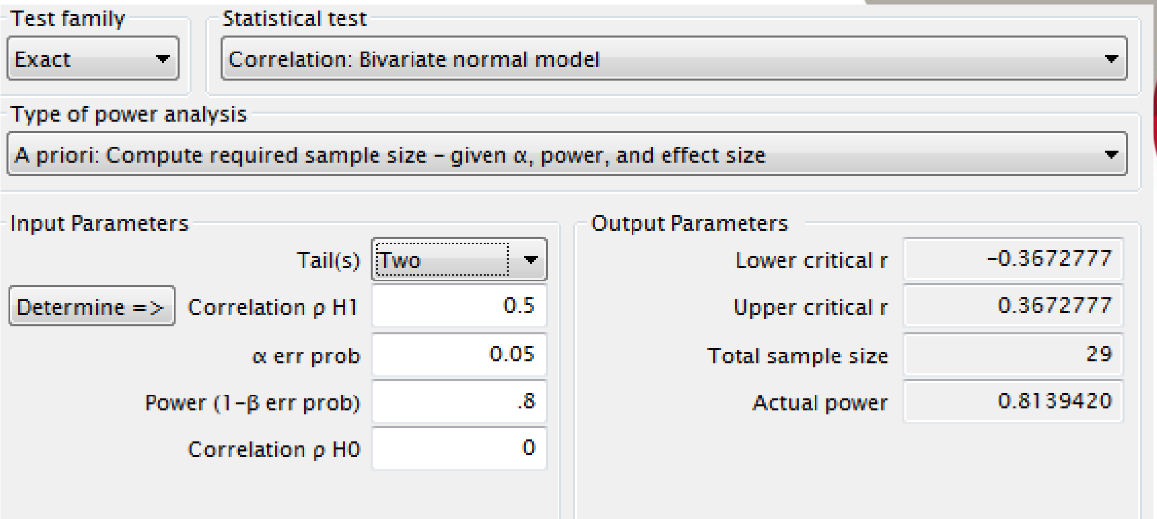
Numerator df: 51.0000000

Denominator df: 471

Total sample size: 175

Actual power: 0.8027275

Figure 6: Results of the power analysis



Test family: Exact

Statistical test: Correlation: Bivariate normal model

Type of power analysis: A priori: Compute required sample size – given α, power, and effect size

Input Parameters

Tail(s): Two

Correlation ρ H1: 0.5

α err prob: 0.05

Power (1–β err prob): .8

Correlation ρ H0: 0

Output Parameters

Lower critical r: –0.3672777

Upper critical r: 0.3672777

Total sample size: 29

Actual power: 0.8139420

Figure 7: Results of power analysis for correlational analysis (correlation coefficient of .5)

Finally, to enhance the scientific contribution of learner strategies, mediational and/or moderational research in social psychology, which has never been used in either the SLA or LT field, must be employed to examine complex relationships among the key variables that have significant implications for construct validity explored in the present study. The use of those statistical techniques "can lead to deeper and more comprehensive knowledge about relationships by providing information about the conditions under which the two variables will be associated (moderation) and also about the intervening processes that help to explain the association (mediation)" (Rose et al., 2004, p 66), and "mediational modals are causal models that illustrate a [developmental] pathway of influence among variables" (ibid). Evidence of causal links between strategy use and proficiency in the speaking domain is seriously lacking and mediational and/or moderational research may hold the key to a fuller evaluation of the validity of strategic competence in the construct of speaking.

6 CONCLUSION

The research reported here was motivated by a lack of evidence about the strategic component of the speaking construct in the LT context. Since the theoretical proposition of the strategic component in the model of communicative competence in the 1980s and various researchers' recognition of it (demonstrated by the inclusion of different versions of the strategic component in various language ability models), the picture that has emerged from the body of research on learners' strategic behaviours in language-learning or language-use contexts is less than clear and conclusive. This study responded to researchers' call (e.g., Cohen, forthcoming, 2012; Macaro, 2006) to look into the interactions among the various key factors, such as respondents' proficiency levels, strategy use by task, method of data collection, and how these factors relate to speaking performance.

This study is the first in the field to examine learners' strategic behaviours through elicitation from stimulated recalls carried out in the participants' first language and corroborated with participants' actual oral production during their performance of the three speaking tasks in the IELTS Speaking Test in testing and non-testing situations. The study went beyond frequency counts and simple analysis of variance and bivariate correlational analysis to capture complicated interactions among various key variables. This study suggests that strategy use differed significantly between testing and non-testing contexts and that the three IELTS speaking tasks elicited significantly different use of strategies in the two contexts. In terms of the relationship between strategy use and speaking performance outcomes, as measured by the oral-language production scores derived from participants' performance on the IELTS speaking tasks, the study's findings did not seem to match findings from previous studies using questionnaires, although not in the speaking domain, of the difference in strategy use between more proficient learners and less proficient learners (e.g., Phakiti, 2003; Taguchi, 2001; Tian, 2000; Yoshizawa, 2002), but seemed to be in line with the findings from Swain et al. (2009) about the use of strategies elicited through stimulated recalls between learners with different proficiency levels on another high-stakes standardised speaking test and from previous studies suggesting that effective learners use strategies appropriate to tasks (see Macaro, 2006).

In terms of learners' strategic behaviours in testing and non-testing contexts, as Davies (2008) stated, the IELTS Test was developed to assess a respondent's English proficiency in relation to his/her ability to participate successfully in English communication. The results, as set out in this report, which probe the cognitive validity issue of the IELTS Speaking Test about whether the test triggers a different set of strategic behaviours than that of non-testing situations, brought the field to a critical point for a large-scale study to rigorously study learners' overt and subconscious strategic behaviours in all its complexity. Bachman and Palmer (1996) once pointed out that whether strategic competence was included in the construct definition for a specific test depended on whether "the test developer had wanted to measure not only language knowledge but also the test takers' flexibility in adapting their language use to different situations" (p 120). In actuality, flexibility is needed in language use in the "real-world," because language use is never static. For a test to reflect authentic language use, for the test takers' performance to be evaluated "according to real-world criterion elements" (e.g., processes and outcomes), and for a test score to be reflective of the inferences to be made about an underlying ability, then the question about the extent to which findings from research on learners' strategic behaviours contribute to making language tests more valid must be taken very seriously.

As Westen and Rosenthal (2003) stated, "construct validation is not only continuous (a matter of degree, not a categorical distinction between valid and invalid) but continual (a perpetual, self-refining process)" (p 609). The study provided some clear directions as to what the next steps should be in establishing the cognitive validity of the IELTS Speaking Test. How the key factors (i.e., *proficiency level*, *context*, and *task*) explored in the study interact with each other and with test performance is an area that can be addressed methodologically and innovatively in ways that contribute to the test's validity and substantially move the field forward.

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APPENDIX 1: SAMPLE CODING SCHEME

Note that some of the examples used to illustrate specific individual strategic behaviours, out of necessity, have been taken out of their original context provided through the participants' IETLS speaking performance and stimulated recall sessions, and, as such, they may be potentially ambiguous to the reader.

Approach strategies: Involving what the test-taker/learner does to orient him- or herself to the task		
Individual strategies	**Definition**	**Example**
Developing reasons	Test-taker/learner offering explanations for doing what he/she does	如果要是就是它是什么构造的，如果房间的结构我说得不是很清楚得话，我就想往更远得地方靠，比如说历史仪式什么之类的对人类今后的影响是什么， 然后就往那方面靠。 If it's about the structures, if I didn't describe the structure of the room very clearly, I would then try to broaden the scope, such as talking about the influence of those historic ceremonies on the future of human kind and then to elaborate more from that perspective. (L3, TASK 2)
Generating choices	Test-taker/learner generating choices	就想例子吧，就比如说家里人啊， 朋友啊，看看有没有， 他们有没有什么什么说的得东西嘛， 还有就是想一些新闻报纸上说得这些东西嘛，拿出来就能用得是最好的。 [I was] thinking [of] examples, such as family members and friends, to see whether they have something [related to the task questions] that I could talk about … also think[ing] of some information from the newspapers, things that I could talk about that could be taken directly from those sources would be the best. (L6, TASK 3)
Generating ideas	Test-taker/learner generating ideas	我之前停顿是因为在想，什么place，当时脑子卡壳了，就想什么place，什么people， 没反应过来想。 Prior to that, I paused because I was thinking "what place?" and I was stuck, trying to think about what sorts of places and people. I wasn't able to react [to the question with ideas] at that moment. (T2, TASK 3)
Identifying task format	Test-taker/learner trying to figure out the format of the task	就因为它主要就是就是类似conversation这种就是方式，我觉得这种方式我是会觉得比较comfortable一点…。 [I figured that] because the format of the task was like a conversation, I felt more comfortable about this task format…. (L8, TASK 3)
Identifying task purpose	Test-taker/learner trying to figure out the purpose of the task	第二部分的话， 毕竟是一个特殊的， 特定的话题…搞清楚你要答什么，就赶快点儿想清楚那几个点。 For the second part, it's a special, a specific topic…. Figure out how you need to respond, and quickly and clearly come up with a few points. (T15, TASK 3)
Making choices	Test-taker/learners narrowing down the choices in response to the question	我最开始想的是长城，但是我感觉长城在，它的破坏不是因为很多人去参观破坏长城，但是漓江古城是因为人为的因素破坏的整个的环境和一些建筑的系统。 The first thing that came into my mind was the Great Wall, but I feel that the damage of the Great Wall is not due to the overpopulation of visitors. The damage of the entire environment and some architectural systems of the LiJiang Ancient City, however, is due to human factors. (T13, TASK 2)
Recalling questions	Test-taker/learner thinking about the meaning of the questions	我是觉得好像每一个问题，对我来说好像都一样。 因为好像我比前面一个已经回答了她，然后下面一个，还是…可能她的问题具体上有一点区别… 。 I felt as if every question sounded the same to me. Because it seems like I have already answered her [the examiner] in the previous question, then the next… or perhaps the questions were slightly different in concrete terms…. (L12, TASK 1)

Recalling what one has said	Test-taker/learner thinking about what he/she has said during the task	我会想我之前回答的那些问题去利用那些去support 我的最后的为什么会express so 这样。 I would think of my previous response and use it to support the reason why I express myself in such way. (L12, TASK 2)
Communication strategies: Involving conscious plans for solving communication problems in order to reach a communicative goal		
Individual strategies	**Definition**	**Example**
Abandoning	Test-taker/learner abandoning ideas or utterances	事实上比如说develop their mind, 估计这样说他也听不懂，也体会不到我那个意思，我就想算了，还是说得浅一点的, 让他容易懂的。 In fact, using "developing their mind" as an example, [I thought that] he [the examiner] probably wouldn't understand or know what I meant if I said that. So I think giving up what I thought and to say something easier instead may help him understand.（T18, TASK 3）
Approximating	Test-taker/learner using lexical or grammatical substitution to approximate meanings	当时有很多时候说的时候忘了，单词不记得, 就可以用另外一个词去代替，或者另外一个句子去大概解释以下都可以…。 I frequently forgot, couldn't remember the vocabulary. At that time, I could do the job by using another word to replace or another clause to roughly explain the meaning. (T18, TASK 3)
Avoiding	Test-taker/learner thinking about avoiding areas that pose linguistic difficulties	在想说到结构的话, 太多的专业术语，你不会specialised vocabularies, 你不会，那怎么办? 那只能说为什么，一些原因, 那些比较简单，避开， 好像是避开自己不会的那一方面。 I was thinking that if I talked about the structure, there would be too many technical terms. What can you do when you don't know the "specialised vocabularies"? I could only explain why, provide some reasons. Avoiding what I didn't know was an easier way to respond. (T19, TASK 2)
Borrowing	Test-taker/learner borrowing phrases from the question	根据他给的问题的提示，然后把这个问题转回来，就是由疑问变成陈述的形式。 Based on his question prompt, I converted the question, from an interrogative structure to a declarative statement. (T7, TASK 3)
Code-switching	Test-taker/learner simultaneously using both L1 and L2 in his/her response	其实其实是混搭着啦。有母语有英文，因为有时候英语有有些词不可能用中文去表示嘛， 表达。所以会两个叉者来用。 In fact, it's a mix of both Chinese and English because sometimes certain English terms are impossible to express in Chinese. As such, I would mix both languages. (L2, TASK 2)
Coining words	Test-taker/learner coining a word to compensate for missing knowledge	For example, the front part of the ground, you can see the… how do I describe it? … We call it in China… "China stock" [stone]. I don't know how to describe it. (T19, TASK 2)
Elaborating to clarify meaning	Test-taker/learner elaborating on his/her response in order to clarify meaning	去回忆一下一些过去，就是想说一些举例子去解释… 。 I recalled the past, thinking about using examples to explain…. (L13, TASK 2)
Elaborating to fill time	Test-taker/learner elaborating on his/her response in order to fill time	但是感觉说得太少，不怎么好的话, 那你还可以再加以解释， 拿几个句子来把这个词解释一遍，或者是怎么那个就把时间，就句子变长一点儿… 。 But I felt that it wasn't good to speak too little, so I would further explain by taking a few sentences and clarifying them again or lengthening the sentences to deal with the time. (L15, TASK 3)

Elaborating to meet requirements	Test-taker/learner elaborating on his/her response in order to fulfil the task requirements	但是到第二部分开始，就是你不是说他问什么你就答什么，而是他问什么，你就要把，你就要答，那个答还要加为什么我要答这个答案，我是怎么想的，都要说出来，就说你要说得多一些，就是你要可以地去说很多。 But from the second part, it’s not just answering what he [the examiner] asked. In response to his question, you need to provide the reason why you provided the answer, your thinking process, to say them all. You need to say more, say as much as you could in response to the question. (T2, TASK 3)
Guessing	Test-taker/learner guessing by using linguistic or other cues	我不会去问她。我会凭刚才的去猜。 I wouldn't ask her [the examiner]. I would guess (the meaning) based on what I just heard. (L2, TASK 3)
Linking	Test-taker/learner making connections between his/her previous knowledge or experience and what he/she is responding to	那先想最喜欢的是什么， 那很简单就足球，那足球完了以后呢，就想以前也写过很多作文啊，就说这足球怎么怎么怎么样，怎么怎么怎么样，从小到大都写，就想随便拿出来几句，就可以说啊。 First I thought about what I like the most. It was simple – soccer. After that, I thought about what I had previously written in compositions about soccer and so on, something I had written about since I was a child. So I simply took the sentences I had written and used them in my response. (L6, TASK 2)
Paraphrasing	Test-taker/learner paraphrasing to clarify meanings	比如说有的词想不起来，那就想想能不能找一个词，换一个自己知道的词来代替它[的意思]。 For example, when I couldn’t think of certain words, I thought about using other words, words [with the same meaning] that I know to replace them [words I didn’t know]. (L9, TASK 3）
Pausing to formulate speech	Test-taker/learner taking pauses in order to formulate a response	也不是一两句就能说完的事儿。困难就是...得停顿想想怎么说， 这不是母语不能说那么流利。 It’s not something that can be accomplished in one or two sentences. The difficulty is … that [I] had to pause and think about what to say. I wasn’t able to express it fluently like using my mother tongue. (L16, TASK 3)
Pausing to generate ideas	Test-taker/learner taking pauses in order to generate ideas	我想一定要再说点儿什么，所以我就想啊，就使劲想，就还有什么是能说的。 I thought that I must say something more, so I was wracking my brain to come up with things to say. (T9, TASK 2)
Pausing to make choices	Test-taker/learner taking pauses in order to narrow down the choices	用词的话想到这两个词儿都可以用， 选哪个好, 就停顿一下。 In terms of words, I thought that both words could be used, so I paused to consider which word was better. (L1, TASK 1)
Referring to notes	Test-taker/learner referring to the notes during oral production	就是看着[笔记上]那个关键词然后把它扩展呈一个句子这样，然后就变的有话说这样。 It’s about looking at the key word(s) [on my notes] and then expanding on them to build a whole sentence. Then [you can] have something to say. (L17, TASK 2)
Referring to questions	Test-taker/learner referring to the questions in order to respond	就是在回答问题时，如果当时没有一个明确的，就再去看一遍这个问题...。 When responding to the question, if there wasn’t a sense of clarity, I would refer to the question again. (T2, TASK 2)
Repeating	Test-taker/learner repeating words or phrases in order to fill the time	还有多的时间， 我记得我好像重复了，重复了两次，就是同一句话重复了两次。 There was still time, and I remembered that I probably repeated, repeated twice. That is, I repeated the same phrase twice. (T8, TASK 2)

Restarting	Test-taker/learner restarting/reformulating his/her response	我又重新开始说的，然后之前有点儿没准备好，没想好怎么说。我觉着有点儿乱，所以然后我就重新开始说一下。 I restarted my response. I didn't prepare quite well and didn't think clearly [about] what to say. I felt that my response was a bit messy, so I restarted my response [to the question]. (L20, TASK 2)
Reviewing notes	Test-taker/learner reviewing notes in order to formulate response	我看我的笔记，如果觉得就是有一部分就是我还能再延伸说，再说下去的话，我就会跟着那部分再去说一遍…。 I reviewed my notes and if there was a certain part that I could elaborate on, I would take that part and talk about that section again [during my talk]. (L7, TASK 2)
Simplifying language	Test-taker/learner simplifying his/her response	就是不用说太复杂的句型， 我觉得，只要简单句， 复合句， 简单的几个句子，能让他明白就行。 There was no need to use complex sentences. I felt that using simple sentences, a few simple sentences that he [the examiner] could comprehend would do the job. (T19, TASK 2)
Slowing down	Test-taker/learner slowing down the speed of delivery to formulate speech	放慢语速，这我觉得是答题技巧。 I felt that slowing down the pace [of my speech] was a technique for answering questions. (T16, TASK 3)
Spelling to clarify meaning	Test-taker/learner spelling out a word to clarify meaning	他又问了我第二个问题，提到那个天气的时候，我知道他问的是那个cold，因为有的时候单词它好像又相同音，不同意思，但我没有反应过来说是天气…。Oh, COLD! C-o-l-d, cold? He asked me the second question again, and when he mentioned the weather, I knew that he said "cold," but sometimes some words are homophones, and I didn't immediately connect the word with the weather. (T19, TASK 1)
Spelling to ensure comprehension	Test-taker/learner spelling out a word to ensure the examiner's understanding	如果这个单词很难就会拼， 因为那个我其实想说就是春节得来历… 因为是中国得传说，怕她不知道，虽然这个词比较简单，所以拼一下。 If a word was very difficult, I would spell it. Because, actually, I wanted to say something about the origin of Spring Festival … because it is a Chinese legend, I was afraid that she wouldn't know it; even though it was a relatively simple word, I just spelled it out. (L9, TASK 3)
Stalling to fill time	Test-taker/learner stalling his/her response to fill time	没话找话说，就是编呗。 I was trying to find things to say even though I had nothing to say. I just made things up. (L16, TASK 1)
Thinking ahead	Test-taker/learner thinking ahead	然后他问的问题，你并不要听完全的问题，就是一直听完，你就可能听到前面什么什么，when或者是who什么，也可以你就已经开始想了，已经脑海里浮现出来了是谁给我这个礼物，或者是什么时候给我这个礼物…我已经在想了。 When he asked a question, it wasn't necessary to listen to the entire question. When you heard the beginning, with when or who, and so on, you could begin thinking. In my head, I started thinking about who gave me a gift, when, and so on. I already started thinking ahead. (T2, TASK 3)
Using keywords	Test-taker/learner using key words to formulate speech	用英文思考也就是思考几个单词， 关键词，key words… 。 I was thinking some words in English, key words…. (T19, TASK 2)

Using L1	Test-taker/learner using L1	「外太空」我怎么说我都忘了我都不知道怎么说。然后想说它就是...是个奇迹，「奇迹」我又不知道怎么用英语表达... 。 I forgot how to say “外太空” [meaning “outer space”]; I didn’t know how to say that. Then I thought that I would say that it was a”奇迹” [meaning “miracle”]. I didn’t know how to say that in English either. (L17, TASK 2)
Using L2 to organise thoughts	Test-taker/learner using L2 to organise thoughts	想的是切合自己经历然后去，想一些...英文... 。 I was using English to think about ideas matching my personal experience. (L20, TASK 2)
Cognitive strategies: involving manipulating the target language in order to understand or produce language		
Individual strategies	**Definition**	**Example**
Analysing linguistic choices	Test-taker/learner analysing different linguistic choices for the response	首先我承认实际上这个问题我没有听明白。因为他advertising，在我得理解是advertisement 是广告，是广告的动词是什么呢，想不出来。 First, I admit that, in fact, I didn’t quite understand the question. Because he used the term “advertising,” which I understood, but I was trying to figure out what would be the verb form of the word “advertising.” (T1, TASK 3)
Analysing questions	Test-taker/learner analysing task questions	他说“How did you learn your English?” 吧，我就想如果现在的话跟以前，说现在学英语，跟以前学英语，那个语法肯定会有一点点不一样，时态方面。 He [the examiner] said: “How did you learn your English?” I was thinking that the grammar with regard to the verb tense would be slightly different if I talked about how I learn English now versus how I learned English in the past. (T18, TASK1)
Anticipating examiner’s feedback	Test-taker/learner anticipating examiner’s reactions	我就找一个相近的词，大概我觉得他应该明白，一个中心，我想说transportation centre 之 类的。 I was looking for a similar word, a word that I thought he would understand – a centre, I wanted to say something like a “transportation centre.” (T11, TASK 3)
Anticipating problems	Test-taker/learner anticipating their problems during the task	我就怕到时候她觉得，突然之间就停、停、停掉我的时候我还没说完。我会想这个问题。 I was afraid that she would suddenly stop me when I wasn’t finished yet. I thought about this problem. (L15, TASK 3)
Anticipating questions	Test-taker/learner anticipating the question	我觉得她第三部分她会问更深入的问题，那样我就更深入地答。 I felt that she would ask a more in-depth question in the third section, and I would respond accordingly. (L3, TASK 3)
Anticipating rating criteria	Test-taker/learner anticipating a task’s rating criteria	第二部分按着问题一个一个回答下来的...因为这样不容易漏掉这个得分点。 For the second section, I responded to the questions one by one so that I wouldn't lose points. (T7, TASK 3)
Attending to oral production	Test-taker/learner directing attention to or concentrating on a specific aspect of a task	有时候说着说着其实潜意识里面是让自己, 比如说注意一下语法啊，或者说时态啊...。 Sometimes during my talk, subconsciously, I actually wanted to pay attention to grammar or verb tenses. (L18, TASK 3)

Attending to task requirements	Test-taker directing attention to task requirements	第二个部分可能就是现场抽一个topic，然后那个可能就是他给你什么，你就说什么，会比较得固定，上面儿要求你什么，你就按着它说什么。 For the second section, the topic was drawn on the spot. Then it was responding to whatever was asked by the examiner. This task is relatively fixed, whatever was asked of you on [the exam booklet], you would respond accordingly. (T19, TASK 3)
Using imagination	Test-taker/learner using imagination in order to respond	然后就发挥自己的想象，就算也没有经历过这种事儿。 Then I just unleashed my imagination, even though I had never experienced it. (L9, TASK 2)
Inferring	Test-taker/learner seeking to understand by using information in the text, dialogue, or monologue to guess the meanings of linguistic items or to make up missing information	如何trip 到school? 但是trip 我理解就是旅游嘛， 或者是 travel，她说是travel，所以觉得可能是反正就是怎么如何去学校，就把它理解成go to school。 How to make a trip to school? But I understood the word “trip” as travel. She then said “travel,” and I felt that the question was about how to travel to school. So, I understood “travel” to mean to “go to school.” (L5, TASK 1)
Memorising	Test-taker/learner trying to memorise what was said in the dialogue or what was written in the text	我这个人脑子里记的比纸上记的要多。 Personally, I memorised more than the notes I took. (L14, TASK 2)
Organising thoughts	Test-taker/learner organising ideas	我就直接想一个就是自己印象最深的一个。然后再想像那边就是什么，想下中间的什么一些细节，有些什么东西… 就稍微想一下。 I was directly thinking about something that I remembered the most, then thinking about some details for a bit. (L18, TASK 2)
Outlining	Test-taker/learner outlining the content of his/her response	我就比如说要说什么， 大概哪个部分说什么，列出来的时候， 我就… 就是那一分钟我就边列边想…。 For example, for the things that I wanted to speak about for each section, I would list them. I used the one minute given to list the points as I organised my thoughts. (T14, TASK 2)
Recalling vocabulary	Test-taker/learner recalling vocabulary	我就在想那个单词嘛，然后就一直在回忆…。 I was thinking about that word; then I kept trying to recall it…. (T4, TASK 3)
Recalling what one has written	Test-taker/learner thinking about what he/she has written	因为一方面还要记得我写的notes写是什么，一方面还要注意上面问题问的是什么。 Because, on one hand, I had to recall and make sense of the notes I took, and, on the other hand, I had to pay attention to the questions on the exam booklet. (T12, TASK 2)
Translating	Test-taker/learner translating between languages	我要先考虑到汉语，然后翻译英语 。 I needed to consider Chinese first, then translate it into English. (L15, TASK 1)
Using intuition	Test-taker/learner using intuition in order to respond	我语法不是很好，所以通常都叫我凭语慼。 My grammar is not very good, so usually I rely on my language sense. (L9, TASK 1)
Using mechanical means	Test-taker/learner writing things down	我想…我想说得再好一点，然后按照我自己得思路一步一步写下来。 I wanted to, I wanted to respond better, so I jotted down my thoughts step by step. (L15, TASK 3)

Metacognitive strategies: involving organising, planning, and evaluating		
Individual strategies	**Definition**	**Example**
Evaluating language skills	Test-taker/learner evaluating language proficiency after completing a task	我意识我口语这个象是语法不足，或词汇不足….。 I became aware of my lack of grammar and vocabulary in my speaking…. (T17, TASK 3)
Evaluating affect	Test-taker/learner evaluating his or her emotional state	就是还是有一点点的紧张，然后就比较，倒会把我的思路给混乱掉。 I still felt a little bit nervous; this would then likely mess up my thinking. (T5, TASK 3)
Evaluating language production	Test-taker/learner evaluating language production after completing a task	就是词汇量比较少一些，想说得一些词也表达不出来…。 A lack of vocabulary led to my inability to express the words I had in mind. (L17, TASK 1)
Evaluating mental process	Test-taker/learner evaluating his/her thinking process	说在那个sit in the riverside嘛…坐在那个河边或者江边，当时突然间就愣住了，就什么也没想，就顿住了。 When talking about “sit [on] the riverside”…sitting alongside the river, my mind suddenly went blank. I didn’t think of anything, just [got] stuck there. (T18, TASK 3)
Evaluating performance	Test-taker/learner evaluating language performance	最后那一段回答得不怎么好，对整个段都回答得不怎么好。 I didn’t answer the last segment very well; I didn’t answer the entire section well. (L17, TASK 3)
Evaluating strategies	Test-taker/learner evaluating the strategies used to perform the task	如果是二十分钟的话，那你就必须记笔记…可是两分钟的话, 我觉得记下来的话，反而就是会束缚一点儿。 If there were 20 minutes, then notes should be taken…. But with two minutes, I felt that notes would make me feel somewhat restricted. (L10, TASK 2)
Evaluating task	Test-taker/learner evaluating the task	一个人独白比较难， 因为一个人在那儿说什么， 然后就凭，就…只是你自己一个人在这儿白话，然后没什么互动, 没什么意思就是。两个人在那边聊天,基本上老师给你一个演示的交流，或者是一个项目要然后你还有心情儿去说，就这么感觉…。 Monologues are more difficult because it’s one person talking without any interaction. It’s not very interesting. I felt that dialogues, with two people chatting, it’s basically like the teacher demonstrating communicative exchanges with you and you would feel more motivated to speak…. (L11, TASK 3)
Generating goals	Test-taker/learner generating goals	我会…可能会注意…自己的语法，就会去更加注重我自己的语法，或者是在一定的时间内，把你那个主要想说的问题先说出来， 然后把那个，思路给理清楚… 。 I will probably pay attention to … my grammar, or I will pay attention to how I can better organise my thoughts and convey my ideas within a specific time frame. (L15, TASK 3)
Generating future solutions	Test-taker/learner generating solutions in response to their performance after a task	我觉得口语这个东西如果你可以常常看新闻这些东西，你可能会比较了解一些比较多的那些咨询，然后你回答起来会轻松一点，你也知道他们一些用字…。 I think that frequently watching news programs or something like that, the information you gathered would enable you to respond with greater ease. You would also be more familiar with some of the words used. (L13, TASK 3)

Generating future strategies	Test-taker/learner generating strategies	我觉得在事前如果准备得话，应该会准备一些那种句型，就是像today, I will talk about，或者I would introduce why blablabla…然后这样的类似的句型。 I feel like if I were to prepare for the task, I would prepare some sentences, such as “today, I will talk about…” or “I would [like to] introduce why…,” sentences like those. (T7, TASK 3)
Setting goals	Test-taker/learner setting a goal for task completion	我想进一步深入地回答这些问题，我就是想从文化的不同方面入手，对比一下中国的文化和西方文化有什么不同…。 I wanted to respond in more in-depth. I was thinking about approaching the question from the perspective of cultural differences, comparing the differences between Chinese and Western cultures…. (L1, TASK 3)
Identifying problems	Test-taker/learner identifying problems in performing a task	我总结还是词汇量不太够。 I concluded that my vocabulary size is inadequate. (L11, TASK 2)
Monitoring examiner’s/teacher’s feedback	Test-taker/learner monitoring the examiner’s/teacher’s feedback	我留意那个考官，看她表情会不会对我说的那个东西感不感兴趣。 I paid attention to the examiner, watching her facial expressions to see if she was interested in what I was talking about. (L17, TASK 3)
Monitoring time	Test-taker/learner monitoring the time while performing a task	然后一定就是，一定不能这儿耽误太多的时间。 Then it must be … I must not waste too much time here. (L9, TASK 3)
Planning	Test-taker/learner engaging in planning in order to perform a task	刚开始就写你想去哪个地方， 然后就尽量想哪个地方的detail吧，就是一些细节，然后因为一个细节你能说很长时间。 At first, you could jot down what place you want to go. Then, try your best to think of the details about that place. The details will enable you to speak for a long time. (T16, TASK 2)
Self-monitoring	Test-taker/learner self-monitoring his/her performance during the task	我就满脑子里头都就会想怎么样这句话我说的非常perfect，没有语法错误，反而给我造成压力，因为就是说,就是说老在想一个问题…。 My mind was fixated on how to ensure that I say a sentence perfectly, without any grammatical errors, which, in turn, brought stress on myself…. (L13, TASK 3)
Self-correction	Test-taker/learner self-correcting errors in his/her oral production	我说得过程中我记得自己纠正了两个关于就是时态方面得错误。 I remember that I self-corrected two tense-related errors during my speech. (T14, TASK 2)
Affective strategies: involving self-talk or mental control over affect		
Individual strategies	**Definition**	**Example**
Fearing judgment	Test-taker/learner minding oral production for fear of judgment	我说得过程中说错了怕她觉得我英语不好啊，觉得只是一个外国人，连英语都说不好还在这边上课…。 While I was speaking, I feared that making mistakes would lead her [the examiner] to think that my English is poor, thinking that how can a foreigner take courses here with a lack of English proficiency…. (L12, TASK 3)
Justifying affective state	Test-taker/learner using reasons to justify their emotions that might affect their performance	一开始有一点点紧张，可能是我刚刚开始吧还没有进入状态…。 I was a bit nervous at first and it’s probably because I had not gone into the situation…. (L15, TASK 1)

Justifying performance	Test-taker/learner justifying his/her performance	这一次, 因为我有experience，然后我就会很具体地说出什么时间，什么地方这样子，这样详细很多。 This time, because I had experiences, I was able to concretely talk about time, location in a much more detailed way. (L12, TASK 2)
Lowering anxiety	Test-taker/learner lowering his/her anxiety	不想紧张这事儿，尽量把精力专注在他们的问题上，专注怎么答。 I didn’t want to think about nervousness. I tried to put all my energy on the questions and to focus on how to answer them. (L15, TASK 1)
Monitoring affective state	Test-taker /learner monitoring his/her emotional state during the task	心态会稍微有一点儿不同，因为随着问题越来越难, 就必须稍微有一点儿紧张感才行。 The mind-set might be a little bit different, because the questions were gradually more difficult and one must feel some nervousness. (L9, TASK 3)
Overriding affective state	Test-taker/learner conquering his/her negative emotion	陌生感就是厚脸皮，就是不管你怎么说我，我都跟你说…。 Dealing with strangeness is to develop thick skin. It’s like whatever you say to me, I just keep talking with you. (T9, TASK 3)
Engaging in positive self-talk	Test-taker/learner encouraging him/herself through positive statements	告诉自己「好，好， 坚持往下，一点儿一点儿来，应该不会太难」，就这样一种心理暗示。 I told myself “Okay, okay, hang in there. Take one step at a time, and it shouldn’t be too difficult” – giving myself this kind of psychological hint. (T7, TASK 3)

Social strategies: involving interacting with the examiner/teacher in order to perform the task		
Individual strategies	**Definition**	**Example**
Asking examiner questions to direct conversation	Test-taker/learner asking the examiner questions to decide what to talk about	Instructor: Let’s move on to talk about national celebrations. Thinking of one main national celebration in your country, where did it start? What are its roots? L12: You mean an exact one or…? Instructor: Yeah, you can think one specific national celebration. L12: National celebration… Can I talk about Olympic Games? Is that [okay]…? Instructor: No, like something [that] happens regularly… L12: Oh, regular. I think [that] must be the Chinese New Year Celebration? Instructor: Yes. (L12, TASK 3)[1]
Asking examiner questions to engage the examiner	Test-taker/learner engaging in conversation by asking the examiner questions	Instructor: Can you tell me where you are from? L5: I’m from China, Shanghai. That was, that is my second-born place. My first was, … is Kunming. Have you ever heard about it? No? (L5, TASK 1)
Attending to the listener’s interest	Test-taker/learner directing attention or concentrating on the listener’s interest	有什么很新颖得东西，然后能够让考官就是能够吸引到。 I tried to think of some novel ideas, which could attract the examiner’s interest. (T5, TASK 3)

[1] During the think-aloud session, the participant revealed that it was her attempt to see if she could talk about a certain topic, a topic about which she felt confident having a discussion with the instructor.

Creating a positive impression	Test-taker/learner trying to create a positive impression on the examiner/teacher	因为通常我考雅思地时候，第一部分我是通畅不太在乎地, 因为只要是跟他聊聊天，把他就是对我地印象就可能尽量往好的那个方面去转，那就好了。 Because usually when I take IELTS tests, I don’t care too much about my fluency in the first part. The main thing is to create a good impression, and that’s it. (L7, TASK 3)
Seeking clarification	Test-taker/learner seeking clarification from the examiner	第三部分的时候问题我问她到底想让我回答到哪个点上，所以就会再问一句。 For the third section, I asked her which specific point she would like me to respond to, so I asked again. (L3, TASK 3)
Seeking help	Test-taker/learner seeking help from the examiner/teacher	我直接就说跟他说，现在我有点紧张，我会直接说出来。再说的时候考官他会就跟我说你放松一些，没事，然后可能这个时候我就会转变一下，就好一点点…。 I told him directly that I was a bit nervous. I would tell him directly. The examiner told me to relax and that everything is okay. Then, at that point I changed and felt a bit better…. (T5, TASK 3)
Seeking social interaction	Test-taker/learner seeking interaction with the examiner/teacher	基本上跟老师互动交流，两个人感觉在那边聊天，跟老师讨论这个历史方面儿交流学习。 I basically exchanged ideas with the teacher. It felt like two people chatting; I discuss the topic related to history with the teacher and learn through dialogical interactions. (L11, TASK 3)

APPENDIX 2A: DESCRIPTIVE STATISTICS BY CONTEXT, PROFICIENCY LEVEL, AND TASK

Strategy category	Task	Context	Level	Mean	Std. deviation	*N*
Affective	1	Non-testing	Advanced	0.109	0.115	10
			Intermediate	0.064	0.089	10
			Total	0.087	0.103	20
		Testing	Advanced	0.123	0.058	10
			Intermediate	0.105	0.100	10
			Total	0.114	0.080	20
		Total	Advanced	0.116	0.089	20
			Intermediate	0.084	0.094	20
			Total	0.100	0.092	40
	2	Non-testing	Advanced	0.055	0.051	10
			Intermediate	0.062	0.044	10
			Total	0.058	0.047	20
		Testing	Advanced	0.077	0.069	10
			Intermediate	0.091	0.073	10
			Total	0.084	0.069	20
		Total	Advanced	0.066	0.060	20
			Intermediate	0.076	0.060	20
			Total	0.071	0.060	40
	3	Non-testing	Advanced	0.147	0.071	10
			Intermediate	0.160	0.071	10
			Total	0.154	0.070	20
		Testing	Advanced	0.137	0.088	10
			Intermediate	0.096	0.084	10
			Total	0.117	0.086	20
		Total	Advanced	0.142	0.078	20
			Intermediate	0.128	0.083	20
			Total	0.135	0.079	40

Approach	1	Non-testing	Advanced	0.070	0.087	10
			Intermediate	0.085	0.069	10
			Total	0.077	0.077	20
		Testing	Advanced	0.058	0.074	10
			Intermediate	0.054	0.109	10
			Total	0.056	0.090	20
		Total	Advanced	0.064	0.079	20
			Intermediate	0.069	0.090	20
			Total	0.067	0.084	40
	2	Non-testing	Advanced	0.097	0.049	10
			Intermediate	0.082	0.062	10
			Total	0.089	0.055	20
		Testing	Advanced	0.114	0.052	10
			Intermediate	0.108	0.087	10
			Total	0.111	0.070	20
		Total	Advanced	0.106	0.050	20
			Intermediate	0.095	0.075	20
			Total	0.100	0.063	40
	3	Non-testing	Advanced	0.088	0.059	10
			Intermediate	0.064	0.043	10
			Total	0.076	0.052	20
		Testing	Advanced	0.105	0.064	10
			Intermediate	0.101	0.047	10
			Total	0.103	0.055	20
		Total	Advanced	0.096	0.061	20
			Intermediate	0.082	0.047	20
			Total	0.089	0.054	40

Cognitive	1	Non-testing	Advanced	0.015	0.033	10
			Intermediate	0.043	0.047	10
			Total	0.029	0.042	20
		Testing	Advanced	0.071	0.069	10
			Intermediate	0.045	0.040	10
			Total	0.058	0.057	20
		Total	Advanced	0.043	0.060	20
			Intermediate	0.044	0.042	20
			Total	0.043	0.051	40
	2	Non-testing	Advanced	0.139	0.063	10
			Intermediate	0.129	0.047	10
			Total	0.134	0.054	20
		Testing	Advanced	0.146	0.092	10
			Intermediate	0.115	0.087	10
			Total	0.131	0.089	20
		Total	Advanced	0.143	0.077	20
			Intermediate	0.122	0.069	20
			Total	0.133	0.073	40
	3	Non-testing	Advanced	0.052	0.043	10
			Intermediate	0.050	0.038	10
			Total	0.051	0.039	20
		Testing	Advanced	0.039	0.038	10
			Intermediate	0.082	0.046	10
			Total	0.061	0.047	20
		Total	Advanced	0.046	0.040	20
			Intermediate	0.066	0.044	20
			Total	0.056	0.043	40

Communication	1	Non-testing	Advanced	0.381	0.139	10
			Intermediate	0.313	0.149	10
			Total	0.347	0.144	20
		Testing	Advanced	0.460	0.145	10
			Intermediate	0.439	0.157	10
			Total	0.450	0.147	20
		Total	Advanced	0.421	0.144	20
			Intermediate	0.376	0.162	20
			Total	0.398	0.153	40
	2	Non-testing	Advanced	0.292	0.081	10
			Intermediate	0.365	0.099	10
			Total	0.329	0.096	20
		Testing	Advanced	0.261	0.094	10
			Intermediate	0.287	0.117	10
			Total	0.274	0.104	20
		Total	Advanced	0.276	0.087	20
			Intermediate	0.326	0.113	20
			Total	1.301	0.102	40
	3	Non-testing	Advanced	0.297	0.079	10
			Intermediate	0.268	0.103	10
			Total	0.283	0.091	20
		Testing	Advanced	0.231	0.112	10
			Intermediate	0.276	0.110	10
			Total	0.254	0.110	20
		Total	Advanced	0.264	0.100	20
			Intermediate	0.272	0.104	20
			Total	0.268	0.101	40

Metacognitive	1	Non-testing	Advanced	0.285	0.142	10
			Intermediate	0.346	0.171	10
			Total	0.315	0.156	20
		Testing	Advanced	0.264	0.120	10
			Intermediate	0.306	0.117	10
			Total	0.285	0.117	20
		Total	Advanced	0.275	0.128	20
			Intermediate	0.326	0.144	20
			Total	0.300	0.137	40
	2	Non-testing	Advanced	0.434	0.112	10
			Intermediate	0.379	0.100	10
			Total	0.406	0.107	20
		Testing	Advanced	0.414	0.118	10
			Intermediate	0.413	0.165	10
			Total	0.414	0.140	20
		Total	Advanced	0.424	0.112	20
			Intermediate	0.396	0.134	20
			Total	0.410	0.123	40
	3	Non-testing	Advanced	0.373	0.104	10
			Intermediate	0.452	0.136	10
			Total	0.413	0.125	20
		Testing	Advanced	0.469	0.114	10
			Intermediate	0.453	0.138	10
			Total	0.461	0.123	20
		Total	Advanced	0.421	0.117	20
			Intermediate	0.452	0.133	20
			Total	0.437	0.125	40

Social	1	Non-testing	Advanced	0.162	0.103	10
			Intermediate	0.172	0.110	10
			Total	0.167	0.104	20
		Testing	Advanced	0.049	0.069	10
			Intermediate	0.079	0.099	10
			Total	0.064	0.085	20
		Total	Advanced	0.105	0.103	20
			Intermediate	0.126	0.112	20
			Total	0.115	0.107	40
	2	Non-testing	Advanced	0.005	0.016	10
			Intermediate	0.005	0.014	10
			Total	0.005	0.015	20
		Testing	Advanced	0.008	0.018	10
			Intermediate	0.010	0.030	10
			Total	0.009	0.024	20
		Total	Advanced	0.007	0.016	20
			Intermediate	0.007	0.023	20
			Total	0.007	0.020	40
	3	Non-testing	Advanced	0.059	0.043	10
			Intermediate	0.030	0.024	10
			Total	0.045	0.037	20
		Testing	Advanced	0.044	0.032	10
			Intermediate	0.016	0.018	10
			Total	0.030	0.029	20
		Total	Advanced	0.052	0.038	20
			Intermediate	0.023	0.022	20
			Total	0.037	0.034	40

Note: The social-strategy variable was excluded from the MANOVA, as previously explained.

APPENDIX 2B: DESCRIPTIVE STATISTICS (NON-ARCSINE-TRANSFORMED) BY CONTEXT, PROFICIENCY LEVEL, AND TASK

Context	Level		AFF Task 1	AFF Task 2	AFF Task 3	APP Task 1	APP Task 2	APP Task 3	COG Task 1	COG Task 2	COG Task 3	COM Task 1	COM Task 2	COM Task 3	METACOG Task 1	METACOG Task 2	METACOG Task 3	SOC Task 1	SOC Task 2	SOC Task 3
Non-Testing	Advanced	*M*	1.20	1.00	4.10	.70	1.60	2.40	.20	2.40	1.50	4.10	4.80	8.20	3.10	6.90	10.20	2.00	.10	1.70
		N	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
		SD	1.135	.943	2.132	.823	.699	1.713	.422	1.265	1.269	1.912	2.300	2.741	1.449	2.558	3.584	1.491	.316	1.252
	Intermediate	*M*	.70	1.20	4.50	.90	1.70	1.80	.60	2.70	1.40	3.30	7.30	7.30	3.60	7.40	12.60	1.90	.10	.80
		N	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
		SD	.823	.789	2.121	.876	1.252	1.135	.699	1.059	.966	1.829	2.497	3.268	1.897	1.838	5.190	1.287	.316	.632
	Total	*M*	.95	1.10	4.30	.80	1.65	2.10	.40	2.55	1.45	3.70	6.05	7.75	3.35	7.15	11.40	1.95	.10	1.25
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		SD	.999	.852	2.080	.834	.988	1.447	.598	1.146	1.099	1.867	2.665	2.971	1.663	2.183	4.512	1.356	.308	1.070
Testing	Advanced	*M*	1.70	1.50	4.70	.80	2.50	3.00	.90	2.80	1.40	5.60	5.40	7.10	3.50	8.40	14.80	.70	.20	1.60
		N	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
		SD	1.160	1.509	3.057	.919	1.780	1.333	.876	1.549	1.506	1.776	2.675	3.872	2.224	3.836	6.529	.949	.422	1.265
	Intermediate	*M*	1.40	1.70	2.90	.80	2.20	3.20	.70	2.30	2.40	5.80	5.70	8.00	4.00	7.90	11.90	1.10	.20	.50
		N	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
		SD	1.430	1.252	2.885	1.398	1.874	2.486	.675	1.829	1.578	2.898	2.908	4.216	1.826	3.665	4.358	1.287	.632	.527
	Total	*M*	1.55	1.60	3.80	.80	2.35	3.10	.80	2.55	1.90	5.70	5.55	7.55	3.75	8.15	13.35	.90	.20	1.05
		N	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
		SD	1.276	1.353	3.037	1.152	1.785	1.944	.768	1.669	1.586	2.342	2.724	3.967	1.997	3.660	5.603	1.119	.523	1.099
Grand Total		*M*	1.25	1.35	4.05	.80	2.00	2.60	.60	2.55	1.67	4.70	5.80	7.65	3.55	7.65	12.38	1.42	.15	1.15
		N	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40
		SD	1.171	1.145	2.581	.992	1.468	1.766	.709	1.413	1.366	2.323	2.672	3.461	1.825	3.017	5.118	1.338	.427	1.075

Note: AFF = Affective; APP = Approach; COG = Cognitive; COM = Communicative; METACOG = Meta-cognitive; SOC = Social.

APPENDIX 3: RESULTS OF REPEATED MEASURES ANOVA ON RATER SCORES

Multivariate tests						
Effect		**Value**	***F***	**Hypothesis df**	**Error df**	***p***
Rater	Pillai's Trace	.040	1.645[a]	1.000	39.000	.207
	Wilks' Lambda	.960	1.645[a]	1.000	39.000	.207
	Hotelling's Trace	.042	1.645[a]	1.000	39.000	.207
	Roy's Largest Root	.042	1.645[a]	1.000	39.000	.207

[a] Exact statistic

Tests of within-subjects effects						
Source		**Type III sum of squares**	***df***	**Mean square**	***F***	***p***
Rater	Sphericity Assumed	.176	1	.176	1.645	.207
	Greenhouse-Geisser	.176	1.000	.176	1.645	.207
	Huynh-Feldt	.176	1.000	.176	1.645	.207
	Lower-bound	.176	1.000	.176	1.645	.207
Error(Rater)	Sphericity Assumed	4.168	39	.107		
	Greenhouse-Geisser	4.168	39.000	.107		
	Huynh-Feldt	4.168	39.000	.107		
	Lower-bound	4.168	39.000	.107		

Tests of within-subjects contrasts						
Source	**Rater**	**Type III sum of squares**	***df***	**Mean square**	***F***	***p***
Rater	Linear	.176	1	.176	1.645	.207
Error (Rater)	Linear	4.168	39	.110		