Second Language Proficiency, Foreign Language Aptitude, and Intelligence

Quantitative and Qualitative Analyses

Miyuki Sasaki

THEORETICAL STUDIES IN SECOND LANGUAGE ACQUISITION

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Simon Belasco
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To my parents and my husband

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Chapter 1

Introduction

1.1. Background

The trait structure of second language proficiency (SLP) that underlies test performance has long been a topic of controversy.[1] Although the strong version of the so-called "unitary trait hypothesis" has been disconfirmed (Oller, 1983b), recent research seems to agree that SLP consists of one common general factor and several specific factors (Bachman, Davidson, & Foulkes, 1990; Bachman & Palmer, 1982, 1983; Carroll, 1983; Davidson, 1988; Harley, Cummins, Swain, & Allen, 1990). In other words, regardless of what specific factors coexist, a general factor appears to explain a large portion of the common variance shared among many SLP test scores.

However, the nature of this general factor is not clear. Several researchers have speculated on this issue. Spolsky and his colleagues (Spolsky, 1973, 1989; Spolsky, Sigurd, & Sato, 1968) have hypothesized that this "general proficiency" (Spolsky, 1989, p. 71) consists of "the creative aspect of language" and "the ability to understand language with reduced redundancy" (Spolsky, 1989, p. 75). Oller (1978, 1981, 1983b, 1983c) has claimed that the essence of this general factor may be a "pragmatic mapping" (Oller, 1983b, p. 356) ability, or an ability to implement knowledge systems in actual contexts. Because this pragmatic mapping ability can also be assumed to underlie all other "cognitive skills" (Oller, 1983b, p. 355), Oller (1981, 1983a, 1983b, 1983c) has also hypothesized that the general SLP factor is directly linked to the core of general intelligence. Bachman and Palmer (1982) have speculated that the general factor they found may be related to "information processing in extended discourse" (p. 462) because the test methods in their study of extended discourse (e.g., interview and writing meth-

ods) loaded more heavily on the general factor than did the other methods (multiple-choice and self-rating methods). Subsequently, Bachman (1990) has suggested that this "information-processing ability" or "strategic competence" is not only related to a general SLP factor, but also to "the realm of general cognitive abilities, or intelligence" (p. 106).

Interestingly, both Oller (1981, 1983a, 1983b, 1983c) and Bachman (1990) have speculated on the nature of the general SLP factor in terms of its relation to general intelligence, or a hypothetically abstract form of general cognitive ability.[2] Because using a second language involves cognitive activity, it seems important to investigate how dependent or independent (language specific) the general SLP factor is from this general cognitive ability. To investigate the relation between the general SLP factor and general cognitive ability, it is necessary to incorporate other cognitive constructs besides SLP in the research design. Oller's and Bachman's hypotheses remain speculative as long as SLP measures are examined in isolation from other constructs relevant to general cognitive ability.

Thus, the present study includes the constructs of foreign language aptitude (henceforth, aptitude) and two types of intelligence (verbal intelligence and reasoning). These cognitive abilities are generally considered to be among the most relevant to SLP. Aptitude and intelligence have generally had higher and more consistent correlations with SLP than have other variables (for example, cognitive styles and personality) (Skehan, 1989). SLP and aptitude/intelligence may appear correlated because they are affected by the same higher-level factor (possibly, general cognitive ability), or because the corresponding higher-level factors are mutually correlated. Some researchers have examined the correlation between aptitude and SLP (Carroll, 1958, 1965b, 1979, 1981; Pimsleur, 1966), and the correlation between intelligence and SLP (Oller, 1978; Stump, 1978), but few researchers have investigated the relationships among aptitude, intelligence, and SLP, especially with regard to the nature of a general SLP factor.

1.2. Purpose of the Present Study

The present study investigated relationships among measures of SLP, aptitude, and two types of intelligence (verbal intelli-

gence and reasoning). There were two objectives: (1) to examine the factor structure of several different types of SLP test scores, and (2) to investigate the relationship between the general SLP factor (G-SLP), and the general cognitive ability factor (G-COG) that was assumed to influence aptitude, verbal intelligence, and reasoning. Several competing hypotheses were tested using structural equation modeling as the central statistical tool. Participants consisted of 160 Japanese university students studying English as a foreign language.

The product-oriented quantitative analyses were supplemented with a small-scale (N=6) protocol analysis of participants' test taking processes to help interpret the statistical results. Part of this protocol analysis was conducted to test Bachman and Palmer's (1982) hypothesis that a general SLP factor is related to the amount of information processing required by a test item.

The research questions of the present study were:

Question 1. **What is the relationship among scores from several different SLP tests taken by Japanese university students?**

This first question was necessary because it was not certain whether the present data would have a structure with a general SLP factor. Although the existence of a general SLP factor has been supported by previous studies (Bachman & Palmer, 1982, 1983; Carroll, 1983; Davidson, 1988; Fouly, Bachman, & Cziko, 1990), it should still be ascertained whether the present data would fit a model with a general SLP factor so that the nature of the general SLP factor could be further examined. In order to answer this first research question, four competing hypotheses were tested:

Model A. SLP consists of several specific factors that are correlated (the correlated specific factor model).

Model B. SLP consists of one general second-order factor and several uncorrelated specific first-order factors (the second-order model).

Model C. SLP consists of one general factor that is directly associated with all observed variables (the one general factor model).

Model D. SLP consists of several independent specific factors (the totally divisible model).

Models A and B represent the partly divisible competence hypotheses tested in Bachman and Palmer (1983) and Fouly et al. (1990). Model C represents the strong version of the unitary competence hypothesis advocated by Oller and his colleagues (e.g., Irvine, Atai, & Oller, 1974; Oller, 1983a, 1979; Oller & Hinofotis, 1980). Model D is the strong version of the divisible competence hypothesis tested in Bachman and Palmer (1983) and Bachman (1982) (see Section 2.1). Models B and C had a G-SLP factor, and were expected to fit the data reasonably well.

Question 2. **What is the relationship between SLP and a general cognitive ability factor that influences aptitude, verbal intelligence, and reasoning?**

In accordance with previous research in psychology and applied linguistics (e.g., Cronbach, 1990; Thorndike & Lohman, 1990; Wesche, Edwards, & Wells, 1982), it was assumed that there exists a second-order latent factor of G-COG that presides over aptitude, verbal intelligence, and reasoning. This hypothesized G-COG factor represents an abstract level of cognitive ability that influences not only aptitude and two types of intelligence, but also other cognitive abilities relevant to SLP.

In order to answer this second question, three competing hypotheses were tested:

Model E. The general SLP factor is identical with G-COG. In other words, only one higher-order factor presides over all SLP latent variables as well as aptitude, verbal intelligence, and reasoning (the identical model).

Model F. The general SLP factor is not identical with G-COG, but these factors are significantly correlated with each other (the correlated model).

Model G. There is no relationship between the general SLP factor and G-COG (the completely separate model).

Model E represents a strong form of Oller's (1981, 1983a, 1983b, 1983c) hypothesis, in which the general factor of any

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