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Publication date

1992

Document Version

Final published version

Published in

European Journal of Cognitive Psychology

[Link to publication](#)

Citation for published version (APA):

Hulstijn, J. H., & Bossers, B. (1992). Individual differences in L2 proficiency as a function of L1 proficiency. *European Journal of Cognitive Psychology*, 4(4), 341-353.

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Individual Differences in L2 Proficiency as a Function of L1 Proficiency

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This paper offers an illustration of the claim that some individual differences in a second language (L2) can be accounted for by individual differences in the first language (L1). Two studies are reported, which examined L2 performance as a function of L1 performance. In the first study, 65 Dutch learners of English performed reading aloud tasks in L2 (English) and L1 (Dutch). In the second study, 50 Turkish learners of Dutch performed reading comprehension tasks in L2 (Dutch) and L1 (Turkish) as well as L2 vocabulary and grammar tests. The results of the first study, obtained by means of co-variance analyses, show that most of the differences in L2 performance due to grade level (grade 9 vs 11) and academic level (higher vs lower) disappeared when performance in L1 was taken into account. The results of the second study, obtained by means of correlational techniques, provide support for the involvement of both an L2-specific (vocabulary and grammar) and a non-L2-specific component (as indicated by L1 reading performance) in L2 reading comprehension. Although the former appeared to be more involved, non-L2-specific factors did in fact contribute positively and substantially to the L2 reading performance of adult second language learners. Moreover, the data of the second study gave rise to the idea that the contribution of non-L2-specific factors may not be stable, but liable to changes in the course of the L2 acquisition process.

INTRODUCTION

Academic performance is assessed for many reasons, ranging from diagnosis (e.g. how to improve methods of teaching school subjects to poorly performing students) to selection (e.g. which individuals to admit to college or university). The assessment of proficiency in a foreign or second language has also become a firmly established part of educational practice and policy. In the Netherlands, for instance, it has been observed that

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The second study reported in this paper was supported by the Linguistic Research Foundation, which is funded by the Netherlands Organization for Research, NWO.

many immigrants from non-Western countries perform poorly in courses in which Dutch is taught as a second language with a view to preparation for college entry. Many educators interpret such results simply as stemming from insufficient second language (L2) proficiency (insufficient knowledge of vocabulary and grammar) and have made a plea for greater provision of L2 instruction facilities. However, poor performance on an L2 test may be due in part to general language skills. Poor performance on an L2 reading test, for instance, may be caused by insufficiently automatised word recognition skills or poorly developed text comprehension skills, deficiencies which manifest themselves in first language (L1) reading performance as well. Furthermore, poor performance on L2 speaking tasks may very well stem from generally deficient oral language production skills, which manifest themselves to the same extent in L1 speaking tasks. In short, individual differences between L2 learners in performance on L2 tasks need not solely be due to differences in *L2-specific* knowledge or skills; they may also be due to differences in *general* language processing skills (apart from factors of a non-linguistic nature such as attitude and motivation). Acknowledgement of the existence of the influence of general, non-L2-specific language-processing factors is important for *practical* educational purposes such as the establishment of scoring guidelines in language testing, and the allocation of remedial teaching facilities. Proper acknowledgement is possible only when *theoretical* L2 proficiency models are available, specifying the L2-specific and non-L2-specific components of the construct L2 proficiency. Furthermore, such models must be *supported by empirical evidence*. However, theoretical L2 proficiency models that take general language-processing factors into account either do not exist at all or are unspecific as to the nature and weight of such general factors (Bachman, 1990, ch. 4; Cummins & Swain, 1986, chs 5 and 11). Moreover, little empirical research has been conducted for the purpose of assessing non-L2-specific factors. The empirical literature on L2 acquisition contains very few examples of cross-linguistic comparisons within individuals. That is, very few studies have tested L2 learners on similar tasks both in L2 and in L1.

In this paper, we report on two such studies, explicitly aimed at contributing to an understanding of general, non-L2-specific language-processing factors. Both studies employed a cross-linguistic, within-subject design. The first study dealt with individual differences in L2 speaking (reading aloud) and the second with individual differences in L2 reading comprehension.

STUDY 1: READING ALOUD

Some studies have investigated fluency factors in L2 reading aloud tasks. The miscue analysis studies by Oziko (1980), McLeod and McLaughlin

(1986) and Rigg (1973, reported in Rigg, 1988; see also Tatlonghari, 1984) all showed substantial individual differences in L2 reading aloud performance. None of these studies used a within-subject design allowing for L2–L1 comparisons, although Cziko (1980) suggested such an approach for future research. To make up for this hiatus, we designed the present study, which elicited performance on a reading aloud task both in L2 (English) and in L1 (Dutch).

Method

Subjects. As it was the intention of the experiment to investigate individual differences using a correlational design (within-subject comparisons), we selected subjects who were likely to differ in L2 reading aloud performance. We selected a subject group (four entire classes of Dutch high school students), the heterogeneity of which was expected to reflect individual differences along one L2-specific dimension (grade 9 *vs* grade 11, with 3 *vs* 5 years of instruction in English as a foreign language) and one non-L2-specific dimension (academic level).

The Dutch high school system consists of two academic levels, HAVO and VWO, which differ moderately in the intellectual demands imposed on the students. This is reflected by the fact that students with a VWO certificate qualify for enrolment at a university, whereas students with a HAVO certificate do not, although HAVO students do qualify for all other forms of higher vocational education.

Altogether, 65 subjects participated in the experiment, 18 in grade 9 HAVO, 18 in grade 11 HAVO, 13 in grade 9 VWO and 16 in grade 11 VWO. Henceforth, we will use the following labels for our independent variables: academic level (low *vs* high) and grade (9 *vs* 11).

Materials and Administration Procedures. Two one-page texts were selected for reading aloud. Both texts had a biographic topic: The English text (264 words) was about Dr Martin Luther King and the Dutch text (341 words) was about the French king, Louis XIV. Twelve words from each text were omitted and replaced by blanks. The omitted words were high-frequency words which could be inferred from the semantic and syntactic cues present in the context. The subjects were instructed to read the texts aloud at their own speed and fill in the missing words. This procedure was used to ensure semantic and grammatical processing of the texts. A 10-line Dutch text provided the students with the opportunity to practise, during which the experimenter adjusted the cassette-recorder. Within each of the four subject groups, the order in which the two texts was read was systematically varied. Missing words, i.e. words that the subjects could not fill in, were provided by the experimenter. The whole procedure (receiving instruction, practice and the reading of two texts) lasted about 10 min. per

Scoring Procedures. *Reading speed* was calculated by dividing total reading time (ranging from roughly 2 to 5 min per text) by the number of syllables for each text. *Disfluencies* were calculated as the sum of the number of repeats, self-corrections and errors (i.e. deviations from the original text, such as deletions, insertions, permutations and substitutions). To avoid overlap of dependent measures, unacceptable responses for the blanks were not included in the error score, and successfully corrected errors were coded only as self-corrections and not as errors. *Words supplied* were coded as the number of syntactically and semantically acceptable words filled in the blanks (the maximum score being 12).

Results and Discussion

Table 1 presents the mean scores for speed, disfluencies and words supplied in Dutch (L1) and English (L2) by academic level and grade. A first perusal of the data was carried out with three $2 \times 2 \times 2$ MANOVAs for the measures speed, disfluencies, and words supplied to assess the influence of one within-subject factor, language (L1 vs L2), and two between-subject factors, academic level (low vs high) and grade (9 vs 11). Not surprisingly, performance in L2 was significantly poorer than in L1 [speed: $F(1,61) = 895.99$, $P < 0.0001$; disfluencies: $F = 8.61$, $P < 0.005$;

TABLE 1
Mean Performance on Speed, Disfluencies and Words Supplied, in L1 and L2, by
Academic Level and Grade

Dependent Variable	Academic Level			
	Low (HAVO)		High (VWO)	
	Grade 9 ($n = 18$)	Grade 11 ($n = 18$)	Grade 9 ($n = 13$)	Grade 11 ($n = 16$)
Speed (syll./sec)				
in L1	3.7	3.6	3.8	4.3
in L2	2.5	2.7	2.7	3.3
Disfluencies ^a				
in L1	12.1	13.8	8.7	6.9
in L2	13.6	14.4	11.4	8.4
Words supplied (max. = 12)				
in L1	9.4	10.3	10.6	11.1
in L2	7.3	9.6	7.6	9.3

^aRepeats, self-corrections and errors.

words supplied: $F = 86.69$, $P < 0.001$]. Since we were investigating individual differences in L2 performance as a function of L1 performance, we calculated Pearson correlations between L1 and L2 performance, and subsequently conducted three 2 (academic level) $\times$ 2 (grade) analyses of co-variance on the L2 measures, taking the corresponding L1 measure as a co-variate, as well as academic $\times$ grade ANOVAs on the L1 and L2 measures separately. The results of these analyses, in so far as they are pertinent to our research goal, will be reported for each measure separately.

The first dependent measure, reading speed, purported to reflect one aspect of the fluency with which programmed speech plans are executed. As expected, substantial differences in reading speed among the 65 subjects were found, both in L1 and in L2. A MANOVA showed a reliable main effect for academic level, reflecting individual differences of a non-L2-specific nature [$F(1,61) = 18.77$, $P < 0.001$], and for grade ($F = 9.42$, $P < 0.005$), and the academic level $\times$ grade interaction was reliable ($F = 7.49$, $P < 0.01$). Furthermore, though grade interacted significantly with language ($F = 9.87$, $P < 0.005$), academic level did not ($F = 0.79$). The L2 measure was substantially correlated with the L1 measure (Pearson $r = 0.81$, $P < 0.001$ one-tailed). In an academic level $\times$ grade ANOVA on the L2 measure, both factors showed a reliable influence [$F(1,61) = 15.48$ and 14.44 respectively; $P < 0.001$] and interacted reliably ($F = 4.48$, $P < 0.05$). However, when L1 speed was co-varied with L2 speed, there was no main effect of academic level, a reliable effect of grade [$F(1,60) = 16.74$, $P < 0.001$], and no reliable academic $\times$ grade interaction. Thus, in the co-variance analysis, the influence of the non-L2-specific factor (academic level) almost vanished, whereas the substantial variance caused by the L2-specific factor (grade) remained.

For the second speech execution variable, disfluencies, the results are even more straightforward than those obtained for reading speed. In the MANOVA, there was a reliable main effect for academic level [$F(1,61) = 16.06$, $P < 0.001$] but not for grade, and there was no reliable academic level $\times$ grade interaction. There were no significant language $\times$ academic level or language $\times$ grade interactions. The L2 measure correlated substantially with the L1 measure (Pearson $r = 0.71$, $P < 0.001$ one-tailed). In an academic level $\times$ grade ANOVA on the L2 measure, only academic level had a reliable influence [$F(1,61) = 10.83$, $P < 0.005$]. However, when L1 disfluency was co-varied with L2 disfluency, there was no main effect of academic level. Thus, in the co-variance analysis, the influence of the non-L2-specific factor (academic level) disappeared.

Much of the ability to supply the missing words in a text is contingent on the level of knowledge of vocabulary and grammar of the language. We therefore assumed that the third measure, words supplied, would reflect

language-specific abilities rather than general language abilities. This assumption was corroborated by the results. In the MANOVA, the main effect of academic level just reached significance [$F(1,61) = 4.03, P < 0.05$] and the main effect of grade was robust ($F = 29.63, P < 0.001$). Furthermore, there were reliable language $\times$ academic ($F = 5.15, P < 0.05$) and language $\times$ grade ($F = 9.91, P < 0.005$) interactions. The L2 measure correlated only modestly with the L1 measure (Pearson $r = 0.29, P < 0.01$ one-tailed). In an academic level $\times$ grade ANOVA on the L2 measure, only grade had a reliable influence [$F(1,61) = 38.67, P < 0.001$]. When L1 words supplied was co-varied with L2 words supplied, there was still a reliable effect of grade [$F(1,60) = 31.84, P < 0.001$]. Thus, in the co-variance analysis, the influence of the L2-specific factor (grade) remained.

For unknown reasons, the grade 11 HAVO students not only failed to attain higher results but sometimes even showed poorer performance than the grade 9 HAVO students on the general language abilities variables. This was not the case, however, for words supplied in L2, the only L2-specific variable! This further illustrates how L2 speech performance of students of a lower academic level, in comparison to performance of students of a higher academic level, is likely to be underestimated on the basis of general rather than L2-specific abilities.

STUDY 2: READING COMPREHENSION IN A FOREIGN LANGUAGE

A second research area in which a clear distinction between L2-specific and non-L2-specific factors may help to clarify some intriguing phenomena is the area of L2 reading comprehension. One such phenomenon, which is a common observation of many foreign language teachers, is that many students appear to read very slowly and with poor comprehension in a foreign language despite the fact that their proficiency in that language at first sight seems adequate. Coady (1979) was one of the first to acknowledge that there is more to L2 reading than L2-specific knowledge. On the one hand, he argued, we expect the student of English as a second language to be deficient in process strategies which involve substantial knowledge of the target language. But there are other aspects of process strategies which relate to reading as a separate skill "in and of itself". Here, Coady referred to non-L2-specific aspects of reading. The underlying assumption is that the "nonlanguage content of knowing how to read automatically transfers to reading in a new language" (p. 9). If this view is correct, then poor reading in the second language may stem from either a deficient knowledge of that language, or from the fact that "many

students have poor reading habits to transfer from their first language" (p. 12).

The experimental studies investigating the above issue yielded evidence for the view that L2-specific factors (e.g. Cooper, 1984; Cziko, 1980) as well as non-L2-specific factors (e.g. Clarke, 1979, 1988; Hudson, 1982) were substantially involved in L2 reading comprehension. As a result, few researchers would still adhere to the extreme position that L2 reading is either exclusively a language or a reading problem. However, the relative importance of both factors is still a hotly debated issue. Although this important question was raised by Alderson as early as 1984, we still lack published accounts specifically aimed at it.

Alderson (1984) reviewed a number of experiments in order to find support for either the view that poor L2 reading is due to poor L1 reading ability (in which case we would expect poor L1 readers to read poorly in the foreign language as well, while the opposite would hold for good L1 readers) or the view that poor L2 reading is due to inadequate knowledge of the target language. He concluded that the evidence available was insufficient to support any firm conclusions, mainly because most of the studies did not use a design appropriate to answering the question.

A first serious shortcoming of most studies appeared to be that only two of the three variables involved were actually assessed. Usually, the third variable, whether L2 knowledge or L1 reading, was only roughly estimated or even entirely ignored. However, any conclusion on the relative importance of both factors to L2 reading would require information on L1 reading ability and L2 reading ability as well as L2 language proficiency. A second weakness was that each independent variable involved, whether L1 reading or L2 knowledge, was measured in different groups of individuals. Obviously, the questions above require a within-subject design to be answered properly, the main reason for this being that such a design allows for the control of all kinds of background variables. Thirdly, Alderson observed a lack of research focusing on a large variety of subjects, including both poor and skilled L1 and L2 readers, and beginning as well as advanced L2 learners. The role played in L2 reading by each of the two factors, L1 reading ability and L2 knowledge, might well change in the course of the language acquisition process, a fact that would only be detectable if research focused on beginning and advanced L2 learners as well as on skilled and poor L2 readers.

Due to these three limitations, any conclusions on the relative importance of L2-specific and non-L2-specific factors to L2 reading comprehension remained highly speculative. Although the findings of many experiments were quite suggestive, direct evidence in support of either the first or the second view remained very scarce. When at all available, it seemed to indicate that L2 reading is both a language and a reading problem, "but

with firmer evidence that it is a language problem, for low levels of foreign language competence, than a reading problem. [However] we do not *know* this yet, and the question needs further refinement and intense investigation" (Alderson, 1984, p.24).

Our own study was set up to gain more insight into the questions mentioned above. It was aimed at investigating the relationship between L1 reading, L2 reading and L2 knowledge, in order to find out to what extent L2-specific and non-L2-specific factors are involved. The experiment, the outcomes of which are reported below, addressed the following research question: Which of the two factors, L1 reading comprehension or L2 knowledge, is a better predictor of differences in L2 reading comprehension among adult, L2 learning, skilled L1 readers?

Method

Subjects. The subjects that participated in the experiment were 50 native speakers of Turkish learning Dutch as a second language. Approximately one-half of the subjects were enrolled in Dutch as a second language courses. The others had already been admitted into a university or an institute of higher vocational training. The subjects had all passed the highest level of general secondary schooling in Turkey (LISE), and were, accordingly, highly proficient in their L1. Their level of L2 language proficiency ranged from intermediate to advanced.

Materials. The L1 and L2 reading comprehension tests consisted of expository passages on four different topics of general interest. Since a within-subject comparison requires that different texts be used in the first and second language, an attempt was made to construct reading comprehension tests whereby both the texts and question items were similar with respect to various text variables, and thus comparable. In order to create such passages, we used the text analysis procedure developed by Meyer (1975). This procedure enabled us to control for a number of potentially confounding variables (e.g. number of sentences and propositions, vocabulary rarity, syntactic complexity and rhetorical organisation), so that the four Dutch (L2) texts that resulted from the procedure only differed in content. In order to control for any topic effect, we selected four topics that were of current interest and widely discussed on television and in newspapers at the time the testing took place (European integration; the use of nuclear energy; the disarmament process; the organisation of second language courses in the Netherlands).

Reading comprehension was tested by means of 16 multiple-choice questions per text. These questions aimed in particular at testing the comprehension of logical and rhetorical relationships between propositions and larger text parts on the one hand, and at the comprehension of the

text's top-level structure on the other. To ensure that the same ability would be measured in both Dutch and Turkish, the Turkish (L1) reading passages and questions were translations of the Dutch originals. The availability of texts on four topics prevented the subjects from being confronted with the same topic twice.

The third variable involved, L2 knowledge, was assessed by means of a widely used test for Dutch as a second language (Janssen-van Dieten et al., 1988). Two parts were selected from this test battery: the part testing knowledge of grammar and the part testing knowledge of vocabulary. Both consisted of 60 multiple-choice items.

Design and Test Administration. Each subject was administered six tests: two L1 reading comprehension tests, two L2 reading comprehension tests and two L2 knowledge tests (one on knowledge of grammar and one on knowledge of vocabulary). Accordingly, each of the three abilities was assessed by two tests. The two Dutch and two Turkish reading comprehension tests that were presented to all the participants each contained a passage on a different topic, the order of presentation being counter-balanced.

The actual testing took place individually. The tests were administered in two sessions, the second occurring between 1 and 6 days after the first session. In the first session, each subject finished one L1 reading test, one L2 reading test and one L2 knowledge test. In the second, the remaining tests were administered. The subjects were allowed reference to the passages while responding. The sessions each took approximately 90 min.

Results and Discussion

Table 2 presents the mean scores and standard deviations obtained on the L1 reading comprehension test, the L2 reading comprehension test and the L2 knowledge test. Note that, for each variable, these data refer to performance on two sub-tests. As was expected, the differences between L1 reading and L2 reading comprehension was significant [ANOVA: $F(1,49) = 38.45$, $P < 0.001$]. As indicated by the mean scores, the L2 comprehension test did not reveal a floor effect, nor did any ceiling effect

TABLE 2
Task Means and Standard Deviations ($n = 50$)

	$\bar{x}$	S.D.
L1 reading comprehension (max. = 32)	23.7	3.7
L2 reading comprehension (max. = 32)	19.6	5.8
L2 knowledge (max. = 120)	82.4	18.8

TABLE 3
Regression of L2 Reading on L1 Reading and L2 Knowledge Predictor Variables ($n = 50$)

Model: L2 reading = L1 reading + L2 knowledge				
	β	t	P	r
L2 knowledge	0.73	7.99	0.000	0.83
L1 reading	0.19	2.09	0.041	0.85

Note: Standardised regression coefficients (β), t -statistics, P -values and multiple correlations (r).

emerge in the L1 comprehension test. The data were, therefore, considered suitable for further analyses with correlational techniques.

The relationship between L1 reading comprehension, L2 reading comprehension and L2 knowledge was investigated initially by calculating the correlation coefficients of the three factors. These coefficients showed that the L2 reading comprehension and L1 reading comprehension scores were moderately correlated ($r = 0.59$), whereas L2 reading comprehension and L2 knowledge showed a strong correlation ($r = 0.83$). (The correlation between L1 reading comprehension and L2 knowledge was 0.54.) These correlations offered a first impression of the impact of L2-specific vs non-L2-specific factors involved in L2 reading: Although the latter are involved in L2 reading, the former seem to be a more prominent factor, even for the advanced L2 learners participating in the present experiment.

To investigate further the relationship between the three variables, a stepwise regression analysis was carried out. Table 3 shows the outcomes of this analysis. The results reported in Table 3 provide immediate evidence that both predictor variables play a significant and substantial role in L2 reading, as we would expect from the Pearson correlations reported earlier. Altogether, 72% of the variance in L2 reading comprehension appeared to be predictable by a linear combination of L2 knowledge and L1 reading comprehension. The degree to which the two regressors, L1 reading and L2 knowledge, contribute to L2 reading can be made visible by calculating the predictors' β -weights, indicating the relative importance of each predictor separately. As shown by Table 3, the β -weight for L2 knowledge is nearly four times as high as that for L1 reading.

In sum, then, the answer to our research question is that, although both predictor variables significantly account for unique variance in L2 reading, the importance of L2-specific knowledge (i.e. knowledge about L2 grammar and L2 vocabulary) for L2 reading comprehension far outweighs that of L1 reading. It seems that the second view mentioned above, which predicts that poor reading in a foreign language is due to inadequate

knowledge of the target language, is more accurate than the first, which predicts a strong, positive relation between L1 and L2 reading comprehension.

It is important to note, however, that non-L2-specific factors positively contribute to L2 reading comprehension and, thus, that such factors may be responsible for differences among L2 readers. Some researchers have suggested that non-L2-specific factors may become more prominently involved in the course of language learning, and that they may eventually become more important than L2-specific factors (e.g. Alderson, 1984; Clarke, 1979, 1988). This experiment did not directly support such a view, since the linear model presented above was more successful in predicting variance in L2 reading comprehension than any non-linear model (e.g. quadratic) that was tested.

Yet, a glimpse of evidence of a possible non-linear relationship between L1 and L2 reading comprehension was present in the data. If non-L2-specific factors were implicated more in the reading of more skilled L2 readers, we would expect a stronger relationship between L1 and L2 reading in the most successful L2 readers of our sample. To test this possibility, we first carried out a 50-50 split in the sample, based on the L2 reading comprehension scores and, subsequently, calculated the Pearson correlations between L1 reading comprehension and L2 reading comprehension of both the first and second sub-groups. The correlation appeared to be almost non-existent for the least successful L2 readers ($r = 0.08$) and moderate for the most successful L2 readers ($r = 0.40$). In this experiment, however, this difference did not diverge sufficiently from linearity to be significant, which may be due to the rather homogeneous sample. In future studies, researchers should nevertheless be attentive to the above trend, since it may emerge more clearly in experiments aimed at a larger variety of subjects, including both poor and skilled L1 and L2 readers, and beginning as well as advanced L2 learners.

CONCLUSION

All too often, L2 acquisition researchers assume that L2 learners have a perfect command of their L1. Hence, in terms of L1 performance, L2 learners are considered and treated as members of a homogeneous set of individuals. Accordingly, it is often tacitly assumed that L2 learners can only differ in L2-specific proficiency. In our view, however, a broad componential perspective on the construct of L2 proficiency, including non-L2-specific factors such as fluency of speech delivery (study 1) and general reading skills (study 2), provides a more fruitful basis for both second language research and second language instruction and testing (see Hulstijn, 1985, for a detailed argument).

Non-L2-specific factors do not exist in a vacuum but are triggered by the task at hand and thereby contribute to and form an essential part of the skills necessary to perform the task (the relevance of task factors in empirical research on second language acquisition is discussed in Hulstijn, 1989). Rather than being interfering task factors, which block our view of language proficiency and are mainly a methodological nuisance, non-L2-specific factors help us to understand the componential nature of the notion of second language proficiency.

The results of the studies reported here suggest that differences between L2 learners on L2 tasks should be adjusted for differences on corresponding L1 tasks, before drawing conclusions from them and basing measures on them. Such a perspective could be useful for language teachers and language testers alike, highlighting the role of non-L2-specific factors in L2 proficiency.

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