



INDIVIDUAL VARIATION IN A PRONUNCIATION PRODUCTION TASK

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Abstract

This study reports on the individual patterns of acquisition of a group of foreign-language pronunciation learners. The data collected from a production task suggest that the individual may be a relevant variable in pronunciation learning processes of the type reported here, and that the notion of shared interlanguages is more controversial than normally assumed. The implications that these findings may have for pronunciation teaching are discussed, ending with a number of suggestions for teachers in this area.

1. Introduction

In second-language (L2 henceforth) learning research in general, and in L2 pronunciation studies in particular, the individual is sometimes believed to be more relevant as a defining feature of the learning process than other factors or variables. For example, Macdonald, Yule, and Powers (1994), in a study comparing the effect of four different types of pronunciation instruction, conclude the discussion of their results noting that “the wide range of different individual reactions should serve as a reminder that the individual learner may represent a more powerful variable than does the instructional setting in the acquisition of pronunciation” (96). Many L2 speech studies show large individual differences in the ability to perceive nonnative contrasts, and in the progress they make under training, but to date little is known about the basis for these reported variations (Leather, 1999). Flege (1988) places the issue of individual differences in acquiring foreign speech sounds in

the wider context of the acquisition of motor skills. He notes, like Leather (1999), that “although most investigators recognize the existence of important differences in ability between individual L2 learners, we do not yet know the basis for these differences” (261). It should be added, nevertheless, that there is a growing consensus among researchers in the field that factors such as mimic ability, cognitive style and personality traits are thought to exert an influence on ultimate attainment. Some of these factors, for example personality traits, are notoriously difficult to assess and measure, and there can hardly be a direct correlation between pronunciation and personality (Major, 1993:184).

Major (2001), in his monograph on L2 pronunciation acquisition [add comma] considers individual variation as a set of factors that interact in the acquisition process: personality factors include empathy, motivation, and sense of identity among others. Flege (1992), in an investigation of vowel production by learners differing in their amount of English–language experience, observed great individual subject differences, a finding which he admits he is unable to account for. Beddor and Gottfried (1995) voice the same observation: “many cross–language studies report unexplained individual differences” (213). They link these observed differences to how language learners vary in their use of learning style and of learning strategies. They further note that these differences appear to be ‘internal’. Strange’s (1995) research on L2 perception and production suggests that their interrelationship may change in complex ways over a relatively long period of time, because studies of these abilities show large individual differences.

Gierut (1988) comments that “there appears [...] to be a gap between applied research and classroom application in the area of second–language instruction. This gap may be partially due to the focus on groups of learners, rather than individuals, in both research and instructional settings” (421). For Gierut, a problem with group research is that it may on many occasions conceal individual variation both in knowledge and in learning. The basis for this alleged mismatch lies in the assumption that “second–language learners are homogeneous and that interlanguage systems are shared by all members” (422); in addition, methodological attention to the group rather than to the individual learner may result in a loss of insight into such important issues as “longitudinal traces of learning; examinations of individual learning strategies and styles, or systematic replication of results” (423).

In my view, Gierut's criticism of focusing too narrowly on groups of learners rather than individuals is relevant because, as will be shown in the following sections of this paper, individual learners have widely divergent patterns of performance, even in cases where these learners are classified as belonging to the same performance group.

2. The experiment

2.1 Subject selection and description

The learner population selected for this study were a group of 22 Spanish-speaking students enrolled in a section of the course "Fonética correctiva del inglés", an optional subject taught in the second year of the "Filología inglesa" degree at the Universidad de Sevilla. The 22 learners were assigned to a low pronunciation proficiency group (N = 10) and to a high pronunciation proficiency group (N = 12). This was effected through a diagnostic test, at the outset of the course, in which the instructor ranked the students according to their pronunciation level, and noted each individual's specific L2 speech areas of attention. This course met 3 hours per week, during a 15-week period, and was a practical tutorial on English segmentals and suprasegmentals, focusing on interference phenomena between English and Spanish, and directed at Spanish-speaking learners. The model accent and materials of the course were American English. The subjects participated voluntarily in the experiment, and were not told the research objectives of the study until the experimental phase was completed.

2.2 Methodology

The 22 subjects were asked to record on a computer 30 lexical items containing English sounds that constitute frequent sources of interference for Spanish-speaking learners. The six target sounds were [tS dZ v S i; I], appearing in initial syllable and final syllable position, where relevant. These sounds were chosen because they were signaled by two teachers who had previously taught the course as frequent sources of interference. For example, many individuals in the learner population confused the words 'chair' [tSer] and 'share' [Ser], sometimes producing [S] in place of [tS] and vice versa. One must add, in this respect, that the local Spanish variety of most of the subjects, Western Andalusian, is a

factor in the type of interlingual misidentifications illustrated, since the lenition of [tS] to [S] is a widespread process for many of these speakers.

The 30 lexical items were elicited from the subjects three times during the 15-week course: at the beginning (T1), in the middle (T2), and at the end (T3). The elicitation techniques included picture identification tasks, prompts with carrier sentences and pointing to objects available in the environment. The recording was done with a head-suspended microphone, Dictaphone for Mac, which was connected to a Macintosh iMac 406. The acoustic analysis and speech synthesis program Praat 3.8 (Boersma and Weenink, 2003) was used to record and store the subjects' productions on the computer.

The 22 subjects each produced 30 words (10 words 3 separate times during the course), which adds up to 660 utterances. Each word was originally recorded as a sound file as described above; in order to rate the items, each recorded word was edited for normalization, re-sampling them at 22 kHz and filtering them with a pre-emphasis set a 50 Hz. Each signal was also cleaned of minor noise interferences. This produced stimuli of cd-quality. In order to avoid a bias against nonnative accent, and "to reduce the influence that one nonnative speech sample might have on the next one being rated" (Anderson-Hsieh, Johnson, and Koehler, 1992:537), 5 native speakers (American English native female speakers with a mean age of 22) were asked to read and record the 30 words of the study; these 150 words then functioned as controls in the stimuli to be later presented to the native raters. A white noise distractor (also sampled at 22 kHz, pre-emphasized) was inserted between each word, so that finally each block contained 100 items.

2.2. 1 Raters

Six native speakers of English, all of them American, were recruited on a volunteer basis for the rating phase of the experiment. They were studying Spanish as a second language at the Universidad de Sevilla, their mean age was 20, and all were speakers of standard American English. Each native judge met individually with the experimenter, in a quiet room, in the language laboratory. The listening exercise took approximately 90 minutes for each rater, and was carried out by using a set of headphones attached to the iMac 406 computer where the subjects' productions were stored in audio file format. The recorded words produced by the learners were randomized, so that the order in which they were

presented to the raters was completely aleatory; the unordered sequence of recorded words was split in 16 blocks of 50 items each; this resulted in 32 rating sheets which the raters completed. The listening task was moderately tiring for some of the native judges, and breaks were taken as often as the raters requested them.

The raters were provided with a prepared sheet in which they were asked to rate how well the word had been pronounced, using a 4-point Likert scale (ranging from 1 = Very incorrectly to 4 = Very correctly). At the same time, and on the same sheet, they completed another 4-point Likert scale (ranging from 1 = Very difficult to understand to 4 = Very easy to understand) asking them how well they understood the word being presented to them.

2.3 Results

The rating procedures described yielded two sets of data: development of accuracy and development of intelligibility. The ratings provided by the native judges were averaged for the members of each group, thus obtaining a score for the low group in both accuracy and intelligibility, and a score for the high group in both accuracy and intelligibility. The scores for each subject were also noted to observe each learner's development during the course, with respect to both accuracy and intelligibility.

2.3.1 Group results

The results for each group, in accuracy and intelligibility are presented in Figures 1 and 2 below.

The averages presented in Figures 1 and 2 were subjected to a comparison of means, analyzed for statistical significance, using the SPSS for Windows (8.0) package, by means of bi-directional paired t-tests; the level of significance assumed for the t-test was set at .05. In accuracy, for the low group there is a significant difference between T2 and T3 ($t = -2.94$, $p = .009$, two-tailed). In accuracy, for the high group there is a significant difference between T1 and T2 ($t = 2.22$, $p = .040$, two-tailed), and between T1 and T3 ($t = 4.00$, $p = .001$, two-tailed). In intelligibility, for the low group there are no significant differences; for the high group, there is a significant difference between T2 and T3 ($t = 2.04$, $p = .057$, two-tailed), and between T1 and T3 ($t = 3.19$, $p = .005$, two-tailed).

Assessment of accuracy by raters

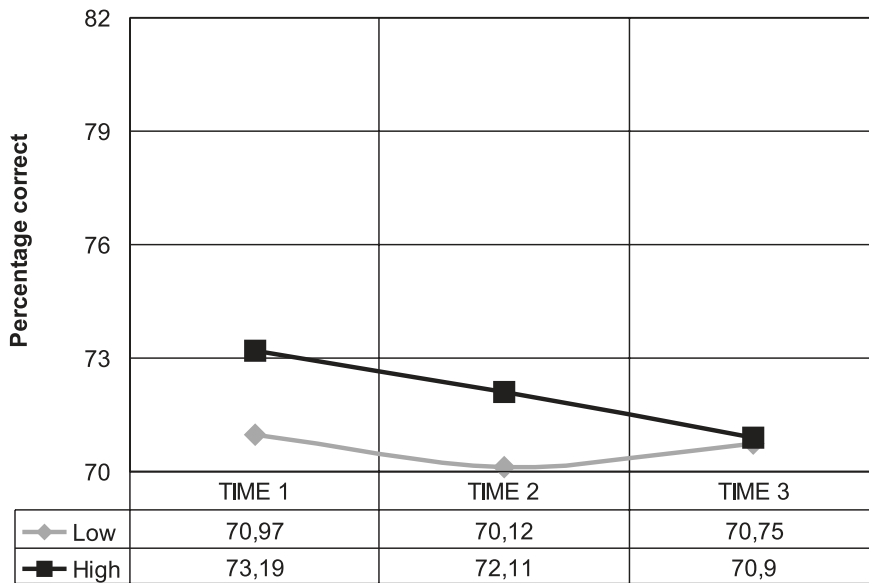


Figure 1: Development of accuracy per group

Assessment of intelligibility by raters

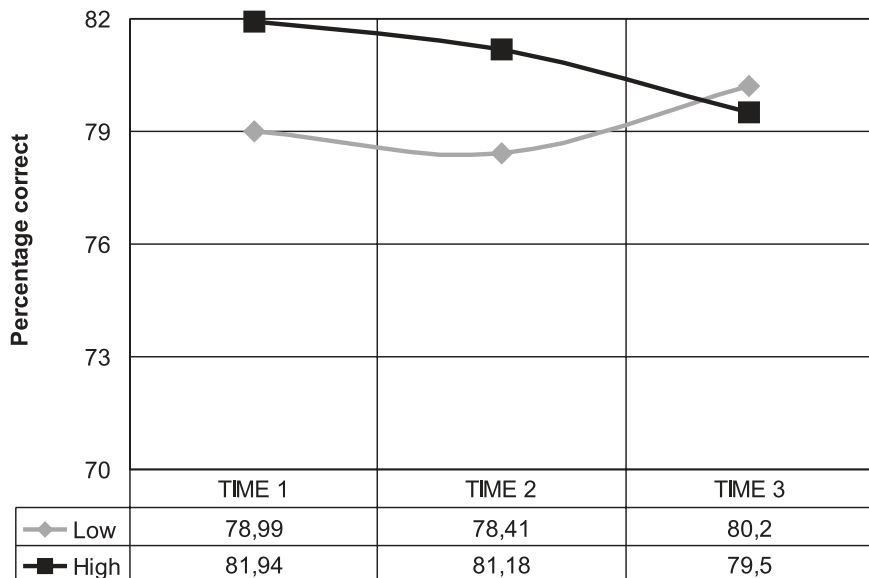


Figure 2: Development of intelligibility per group.

Finally, as far as accuracy is concerned, at T1, the mean of the high group (73.19) is significantly higher than the mean of the low group (70.97); $t = 2.60$, $p = .019$. At T2, the mean of the high group (72.11) is significantly higher than the mean of the low group (70.12); $t = -3.48$, $p = .003$. Finally, at T3, the difference in means (70.75 and 70.9 for the low and high group respectively) was not significant.

In intelligibility, at T1, the mean of the high group (81.94) is significantly higher than the mean of the low group (78.99); $t = -4.10$, $p = .001$. In T2, the mean of the high group (81.18) is significantly higher than the mean of the low group (78.41); $t = 7.60$, $p = .000$. Again, as with accuracy, at T3 the difference in means (80.2 and 79.5 for the low and high group respectively) was not significant.

2.3.2 Individual results

Figures 3, 4, 5, and 6 below present the development of accuracy and intelligibility for each subject of both the low and high proficiency groups.

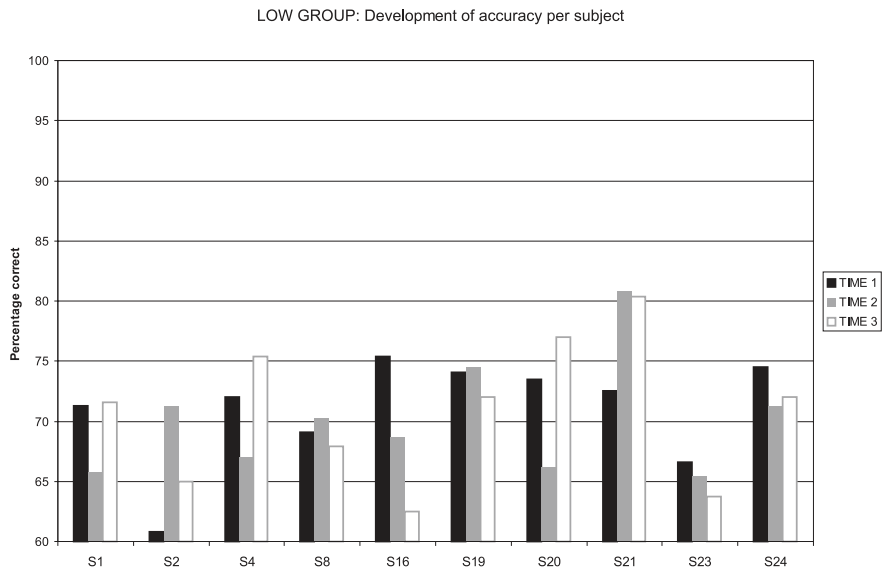


Figure 3: Low group: individual development of accuracy

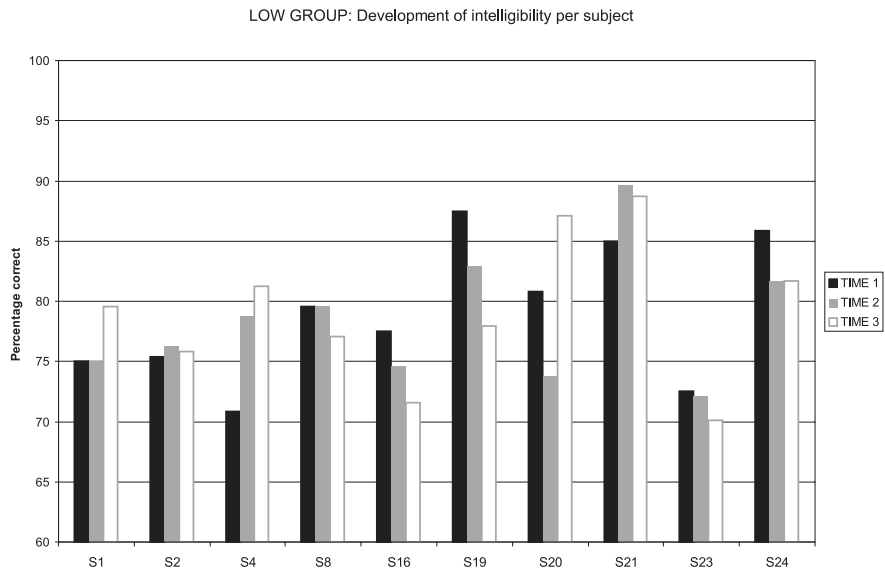


Figure 4: Low group: individual development of intelligibility

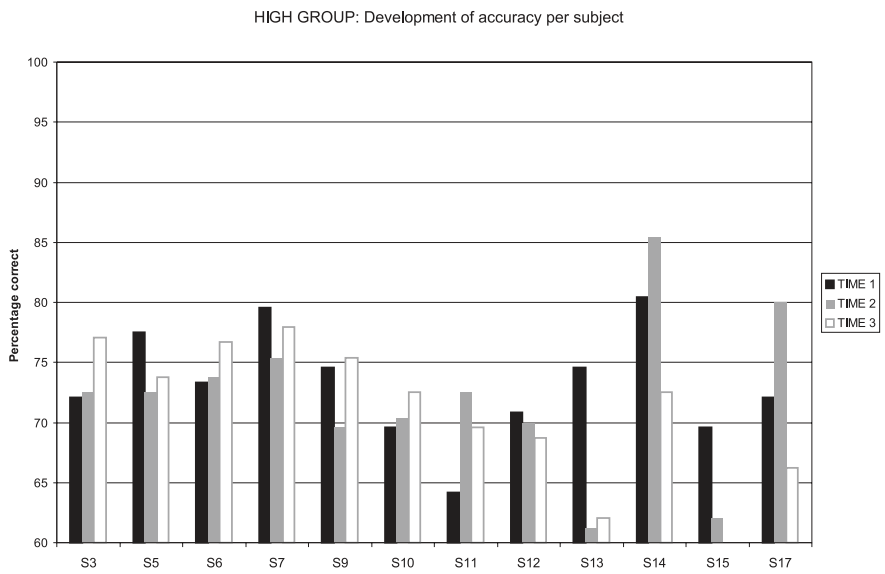


Figure 5: High group: individual development of accuracy

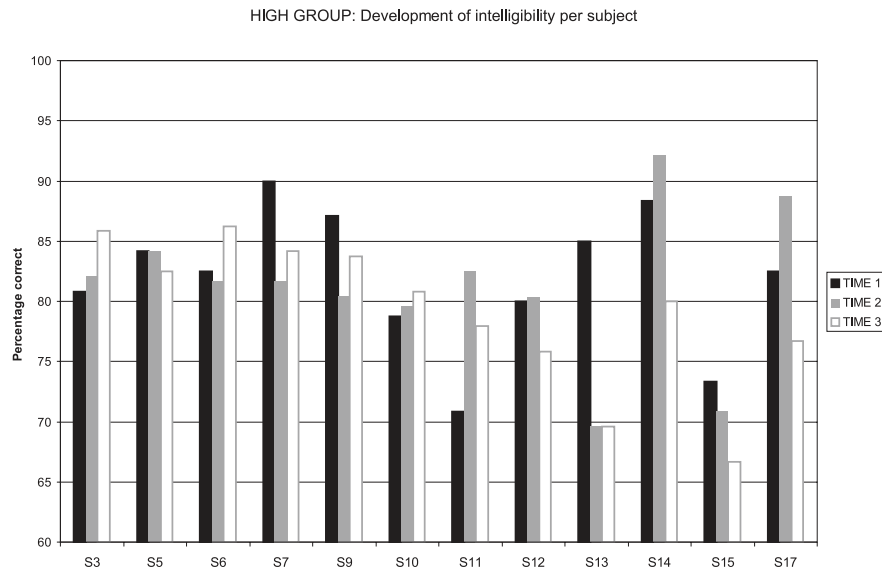


Figure 6: High group: individual development of intelligibility

3. Discussion

3.1 Group performance

Expectedly, the high group is rated as being both more accurate and intelligible than the low group. But note that this situation is obtained only at the beginning and the middle of the course; by the end of the period of instruction, the difference between the two groups is lost, and in fact in intelligibility the low group fares slightly above the high group. Less expected are the results of the high group: they get worse in their overall pronunciation skills (production and intelligibility). In addition, the low-proficiency learners show a restructuring effect (to be analyzed in more detail below) in their development of both accuracy and intelligibility, since their performance deteriorates from the beginning of the course (T1) to the middle (T2), and then improves by the end of the course (T3). Figures 1 and 2 above present these tendencies graphically.

For the low group, there is a significant increase in accuracy between the middle of the course and the end of the course. This means that the beneficial effects of instruction took some time to be effected, and did not become evident until the second half of the course. Notice,

however, that the mean for the group by the end of the course (T3) is 70.75, still slightly below their average at T1, at the beginning of the course, which is 70.97.

However, in the high group we observe the reverse pattern of development: a significant decrease from the beginning of the course to the middle of the course, and more generally and importantly, a highly significant decrease between the beginning and end of the course. These results may seem surprising, but in all likelihood the learners of the high group, being at a more advanced level, may have developed habitual, systematic pronunciation errors, which the learners of the low group have had no time or experience to develop (Cunningham Florez, 1999:1). For the learners at the high level, because the course they are taking focuses very precisely on speech accuracy, their existing interlanguage is disrupted by instruction, leading to a less stable performance, with increased erroneous forms. This phenomenon, first attested in child language, is today widely recognized in L2 literature as restructuring (MacLaughlin, 1990). The usual pattern of restructuring is “getting worse before getting better”, in the words of Macdonald, Yule, and Powers (1994: 94). In the case of this experiment, improvement has not yet occurred, but that may be an indication that restructuring will happen in the future (some time after T3, although this is rather speculative).

If restructuring is the correct explanation for the observed development of pronunciation accuracy in both groups, then we also have a unified account for what happens with the low group; the gain observed from T2 to T3 may be an indication that these learners are in the process of substantial improvement; the high group, on the other hand, having begun at a more advanced level, logically has more restructuring to deal with.

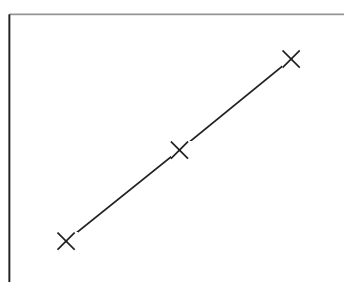
In intelligibility, these patterns of development are, to some extent, reproduced. None of the differences between means within the low group are significant, a fact that may be explained by individual variation in this category (as will be seen below).

However, the sequence of progress is clearly an example of the restructured effect, where $T3 > T1 > T2$, that is, getting worse ($T1 > T2$), before getting better ($T3 > T1$). And again, as regards accuracy, the high group seems to get progressively worse from the beginning of the course to the end of the course; the decrease between T2 and T3 is marginally significant, but the deterioration from T1 to T3 is fully significant. More

generally, the results of both accuracy and intelligibility are rather unexpected in that the global improvements are fairly modest. One could even maintain that the instructional treatment has led to a deterioration in the learners' overall pronunciation.

3.2 Individual performance

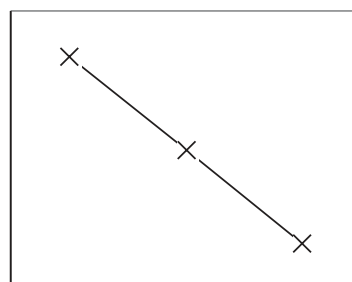
The individual data presented in Figures 3, 4, 5 and 6 above show the patterns of development for each subject of the production task. Following Yule and Macdonald's terminology (1994), the patterns of behavior across three points in time observed in this experiment are of one of four types: progressive improvement ($T3 > T2 > T1$), progressive deterioration ($T1 > T2 > T3$), deterioration and improvement ($T3 = T1 > T2$), or improvement and deterioration ($T2 > T3 = T1$). These are shown in Figures 7, 8, 9 and 10 below.



TIME 1 TIME 2 TIME 3

Figure 7:

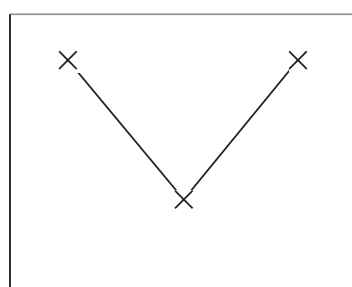
Progressive improvement ($T3 > T2 > T1$)



TIME 1 TIME 2 TIME 3

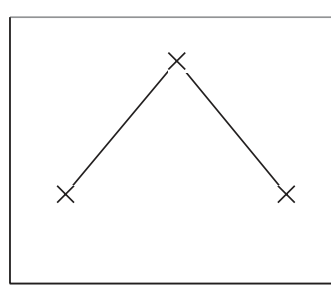
Figure 8:

Progressive deterioration ($T1 > T2 > T3$)



TIME 1 TIME 2 TIME 3

Figure 9: Deterioration and improvement ($T3 = T1 > T2$)



TIME 1 TIME 2 TIME 3

Figure 10: Improvement and deterioration ($T2 > T3 = T1$)

There are of course other potential configurations, for example no change, where $T1 = T2 = T3$, but these are not attested in the data.

3.2.1 *Low group*

In the low group in their development of accuracy, none of the individuals became progressively better, two became progressively worse, S16 and S23, four showed a restructuring effect, that is, deterioration and improvement (S1, S4, S20, and S24), and four subjects improved and deteriorated (S2, S8, S19, and S21). The most striking pattern is the performance of subject 23. This learner has the second lowest score at T1, and from that point onward this participant only decreased in performance. Subject 2 seems to follow an almost reverse pattern; this learner has the lowest score at T1 but experiences a dramatic increase at T2, to return to a very modest level at the end of the course (T3). Other significantly poor performances are manifested at T3 for subject 16, and T2 for subject 20. At the opposite end of the scale, subject 21 appears to perform throughout the course even above the level of the best learners of the high group; subject 21 is rated as being the most accurate of the group at the middle of the course (T2) and at the end of the course (T3).

The restructuring effect so pervasive in pronunciation acquisition is illustrated perfectly in the development of subject 20 who performs rather well at T1, then deteriorates quite markedly at T2, and finally improves so much in accuracy at T3 that this subject is evaluated as being the second-best in accuracy in the group. Subject 16 undergoes exactly the opposite process: at T1 the subject shows the best performance in the group and deteriorates at T2 well below the average and continues to worsen so that by the end of the course (T3) the score is the worst of the entire group. The behavior of these two learners serves as a reminder of the diverse effects that instruction may have on different individuals, and as evidence of the often disparate and even contradictory interlanguage stages observed for individual learners, widely established by L2 research.

It can also be observed that T2 and T3 are the two stages of learning that present the most variation, an outcome that is expected if teaching is acknowledged as an intervening factor in the developing interlanguage of these learners; restructuring and developmental changes are seemingly motivated by the instructional event which began after T1.

With respect to intelligibility, in this group only one subject, S4, shows progressive improvement. Five learners, S8, S16, S19, S23 and S24 deteriorate continuously. Two subjects, S1 and S20 deteriorate and improve, and another two, S2 and S21 improve and deteriorate. The data in Figure 4 which illustrates individual intelligibility performance in the low group, are to a considerable extent consistent with the variation noted for development of accuracy for this group. Again subject 23 exhibits a significantly worse performance than other members of the low group. T1 is a critical stage for subject 4 who shows the worst score in the group, and both subjects 16 and 20 have the lowest score at T2 (excepting the rather extreme behavior of subject 23). Finally, subject 16, who shows the worst score in accuracy, likewise exhibits the worst level of intelligibility score at T3, if we accept once more that the nonstandard development of subject 23 is excepted. T2 and to a lesser degree T1 are the stages of learning that present the largest differences in performance among the participants of this group.

Taken jointly, the individual data in accuracy and intelligibility of the low group signal a few members of the group as subjects that have a tendency towards lower performance than the rest of the group. These subjects are 2, 4, 16, 20, and 23. Furthermore, the quantity and type of individual variance suggest that pronunciation training has widely divergent effects on a population of learners with a less advanced proficiency level, and that it may be the individual, rather than the group who constitutes a more significant variable in the pronunciation acquisition process as stated by Macdonald, Yule, and Powers (1994: 96).

3.2.2 High group

Figure 5 shows the development of accuracy of the individuals in the high group. Here three subjects, S3, S6, and S10 became progressively better. Two subjects became progressively worse (S12 and S15), whereas four subjects, S5, S7, S9 and S13 deteriorated and then improved. Finally, three subjects, S11, S14 and S17 improved and then deteriorated. One evident contrast between the data displayed in these two charts and the individual scores of the low group is that, first, as a whole, the learners of the high group are relatively more homogeneous, that is, more subjects perform equally, and secondly, that in this group most of the learners tend to manifest the same pattern of development in the two skills of

accuracy and intelligibility. Of course, this general observation has to be weighed against the specific performance of the group's subjects.

With respect to accuracy, there are two subjects with an accuracy performance that falls significantly below the level observed for the rest of the group, subjects 13 and 15. Interestingly, both learners have the lowest scores in this group at T2 (subject 13) and T3 (subject 15). Two more subjects are worth noting: subject 11, with the lowest score at T1, and subject 17, who performs markedly worse than the rest at T3. In section 3.1 I underlined the rather unexpected difference in performance between the two groups of the experiment, with the less advanced learners performing progressively better, collectively speaking, than the more advanced learners. The individual variances I have just noted may explain, statistically, the impressive drop in final performance (between T2 and T3) of the high group, and its leveling off with the low group. Subjects 11, 13, and especially subject 15, hence, may not be representative of the performance level of the high group, at least as far as accuracy is concerned.

In intelligibility, two subjects (S3 and S10) got progressively better, three (S5, S13, and S15) progressively worse, three (S6, S7 and S9) deteriorated and improved, and lastly four subjects (S11, S12, S14 and S17) improved and deteriorated. An inspection of Figure 6 reveals that, as in accuracy, subjects 11, 13 and in particular subject 15 are evaluated as being much less intelligible than the rest of the participants in this group. Moreover, these three subjects exhibit the same pattern of performance as in the development of accuracy: subject 11 is the least intelligible in the group at T1; subject 13 has the worst score at T2; and subject 15 is at the bottom of the intelligibility range for the group at T3. This learner is also the least intelligible of all in the high group. It could be claimed that, as in the development of accuracy, the extreme behavior of these subjects may have contributed to a substantial drop in the group average.

3.3. *General discussion*

When considering the results of the production task at a group level and at individual levels, very different patterns of learning emerge. There is a stark contrast between the overall achievement of the group results and much of the behavior exhibited by the subjects, as has been noted in

the previous section. In particular, it seems that the greater amount of individual variation within the low proficiency group, and the exceptional behavior of a few subjects in the high group may have contributed to a misreading of” the results when considered at group level.

It is noteworthy that none of the individuals in the low group got progressively better in accuracy during the course of instruction, and only one did so in intelligibility. The members of the high group fared somewhat better, but their individual results are still far from what teachers would normally expect after 15 weeks of instruction. These findings are congruent with the attested patterns of development reported in the only other study where individual behavior patterns are analyzed in detail, namely the study carried out by Yule and Macdonald (1994).

The results of the production task also draw attention to the heterogeneous nature of the interlanguages of these learners; the amount of variation is so extensive that at any given point in time (T1, T2, T3) there seems to be little correspondence among these learners’ performances. The notion that they share a common interlanguage is, to say the least, quite questionable.

The individual reactions observed lead us to question the effect of instruction; whereas at a group level a number of clear tendencies can be identified, as we have seen in section 3.1 above, the individual variation, both in its quantity and type is so wide that perhaps the results pose more questions than answers; in this respect, it seems evident that a new line of fruitful research has been initiated.

4. Implications for teaching

The individual emerges in this study as a powerful factor in the learning process. Accordingly, much of the focus of pronunciation teaching should be tailored to address and satisfy individual needs, rather than groups classed according to supposedly homogeneous proficiency levels. Pronunciation teachers should perhaps expect and recognize back-and-forth patterns of learning in their learners, given that these patterns have been identified in this study as the most common. Accumulative, linear acquisition seems to happen infrequently in this language area, at least when learners are observed in relatively short spans of time

(one must remember that the course was 15-weeks long). There is sufficient evidence to assume that other learner populations will exhibit similar learning behavior; this study compares two sufficiently diverse groups and therefore the results reported here may be extended to other teaching situations with a fair amount of reliability.

The effectiveness of pronunciation instruction is a complex process that, according to the data presented in this study, cannot be measured in a simple manner. Teachers should be careful when making decisions about testing their learners over short (or even mid) periods of time, given the diverse effects that teaching has on different individuals. This leads directly to the issue of individual assessment and the focus on individual learners and learner needs.

Another important observation that can be inferred from the data presented is the mainly highly heterogeneous nature of the interlanguages these learners exhibit. This has obvious implications for the teaching practice, especially with respect to designing materials and courses according to proficiency levels (that is, thinking in terms of *groups*). These methodological procedures should be tailored to specific *individual* needs and levels, as the results of this study imply.

The FL teaching profession has already started to move toward more learner-centered methodologies, and this should be reflected in up-to-date pronunciation teaching. There is evidence that such reorientation is already being effected. Toogood (1997) describes how a self-access center can be effectively customized to specific learner populations concerning their pronunciation needs. The teaching approach adopted by many professionals includes a phase where individual learners' needs are analyzed and incorporated into the teaching practice (see e.g. Fraser, 2001; Kendrick, 1997). Frameworks which are used to analyze students' needs and which are subsequently used for teaching are in this sense a very valuable tool to acknowledge the role of individual learning idiosyncrasies. Learner centeredness renders itself as a promising approach that takes into account individual behavior in the learning process. If the burden of learning is shared and to some extent shifted from the teacher to the learner, it is likely that each individual student will benefit more readily from the learning process. Individualization leads to enhanced learner performance. Learner centeredness entails making learners responsible for their

learning, and in this respect the approach taken by Hahn (2002) and Hahn and Dickerson (1999) in which students are carefully provided with the necessary skills and opportunities to self-monitor their pronunciation is a good starting point.

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