



PAŃSTWOWA
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Ewa Waniek-Klimczak

**Socio-psychological
conditioning in ESL
Pronunciation:**

**Consonant voicing
in English spoken by
Polish immigrants
to Britain**

WŁOCŁAWEK 2009

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Socio-psychological conditioning in ESL Pronunciation:
Consonant voicing in English spoken by Polish immigrants to Britain, Włocławek 2009

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Introduction

Second language acquisition in a natural environment, i.e. in the surroundings of the target language speech community, entails first-hand experience of both the language and the culture specific for the community. The experience, referred to as acculturation, has been reported to affect the development of second language proficiency. In an early study, Schumann (1978) analysed the process of second language in a 33-year-old Costa Rican immigrant to the U.S. He observed considerable problems, which he attributed to the social and psychological distance of the immigrant from the majority language community. The observation led to the conclusion that the nature of the cross-cultural experience in general, and the distance in particular, may determine success in adult second language acquisition. The Acculturation Model formulated for SLA (Schumann, 1986) predicted that “learners will acquire the target language to the degree they acculturate to the target language group.” (Schumann, 1986: 379). Referred to as the process of change caused by long-term, first-hand contact between individuals differing in cultural origins (Ward, Bochner and Furnham, 2001), acculturation corresponds to a variety of social and psychological factors. The acculturation process involves the interaction of variables operating at the societal level (i.e. social, political, economic and cultural factors of the society of origin and the society of settlement) and the individual level (i.e. characteristics of the person and the characteristics of the situation). A newcomer to a different culture experiences stress and different levels of skill deficits to which s/he responds at the affective, behavioural and

cognitive level. The acquisition of the language of the majority language community can be clearly viewed as an outcome of the inter-cultural experience, linked in an intricate way to other psychological and socio-cultural outcomes. It is only through the observation of the process of second language acquisition in natural setting that we can formulate predictions as to the relationship between the socio-psychological conditioning and language learning.

This book attempts to analyse the conditioning in the acquisition of one aspect of second language speech: pronunciation. It reports on a case study of chosen temporal phonetic parameters used in phonetic implementation of English spoken as the second language by Polish immigrants to Britain. The study investigates the relationship between the phonetic characteristics and socio-psychological situation of the speakers in the data elicited from two groups of subjects representing different groups of Polish immigration to the U.K.: the post-war immigration and the immigration of the Solidarity era (1980s). The data are discussed from the perspective of the role which the investigated phonetic parameters play in marking the second-language speech production of subjects who are members of the Polish minority speech community in Britain.

The phonetic aspects chosen for analysis are claimed to function as markers, i.e. they are claimed to be relatively high in speakers' consciousness. The degree of this consciousness is assumed to correspond to the type of marking (Dowd, Zuengler and Berkovitz, 1990). The study investigates the implementation of selected phonetic categories in the English phonological system as acquired by second language users: consonant voicing, vowel duration and aspiration, which are all used in the phonetic implementation of a phonological category Voice. The investigation will concentrate on the analysis of the following phonetic parameters used in implementation: Voice Onset Time (VOT), closure duration and vowel duration. All three parameters are temporal in nature, i.e. they involve timing relationships. The measurements are taken in milliseconds from the spectrograms or waveform displays:

- Voice Onset Time: measured in plosive consonants from the release of the closure to the onset of voicing (first glottal pulse)

- closure duration: measured from the beginning to the end of closure (lack of any noise or sound)
- vowel duration: measured from the beginning of a regular formant structure of glottal pulsing to the end of a regular formant structure.

The phonetic data will be analysed in the broad context of the social and cultural distance as defined by Acculturation Model by Schumann (1978). The conclusions formulated with reference to the pronunciation of the two groups of Polish immigrants in Britain are claimed to offer the background for further studies into the acquisition and use of the English sound system by native speakers of Polish, especially in the position of immigration. The recent increase in the number of Polish native speakers who experience the English language in the natural context by deciding on long-term settlement in the English speaking countries (the U.K and The Republic of Ireland) motivates the re-analysis of the data coming from older immigrants, whose experience may help explain the phenomena crucial for inter-cultural and inter-linguistic experience.

Chapter One

The Socio-psychological Factors in the Acquisition of Second Language Phonology

As the present study concentrates on phonetic parameters used in phonetic implementation of English as the second language by Polish native speakers, the issue of the second/foreign language acquisition and learning forms the background against which the use of individual parameters and estimated success in achieving a native-like command of these parameters can be discussed. All subjects whose speech patterns are investigated here are second language learners: their speech production reflects the inter-cultural and inter-linguistic experience. The functionally biased discussion of the data elicited from the second language users requires the consideration of socio-psychological factors influencing second language acquisition.

The development of second language proficiency can be studied from the point of view of second language acquisition as a dynamic process or as a certain stage of language proficiency which enables second language users to function within the majority, i.e. second language community. As we shall discuss the use of phonetic parameters by the speakers at one moment in their linguistic development, it is the latter approach that we shall use. However, the dynamism of language development will be present in the cross-sectional comparison across subjects and groups of subjects: we shall compare the use of individual phonetic parameters and the combination of these parameters in relation to socio-psychological conditioning of second language acquisition.

The influence of social and socio-psychological factors on the second language acquisition and production has long been recognized and studied,

offering numerous insights into the nature of the second language speech. The sociolinguistic quantitative analysis introduced by Labov in the studies of “The Social Stratification of English in New York” (1966), and “Sociolinguistic Patterns” (1972), although concerned with monolingual communities in the first place, offer an excellent framework for the study of variation within bilingual or multi-lingual communities as well. The studies conducted by Lambert and his associates (Lambert, 1967; Gardner and Lambert, 1972) were devoted to the investigation of the effect of subjects’ attitudes and cultural beliefs on individual differences between subjects; the studies of social markedness in speech led to the formulation of Accommodation Theory advocated by Giles and associates (Giles, Bourhis and Taylor, 1977; Giles, Scherer & Taylor, 1979; Beebe & Giles, 1984). According to the Acculturation Model formulated by Schumann (1978, 1986) social and affective factors combined constitute a primary cause of variation (see also Ward et.al., 2001).

1.1. The background: selected approaches to the relationship between the socio-psycholinguistic factors and second language speech

The discussion of a particular second language acquisition or learning theory in the context of the actual speech data elicited from the members of a minority group is mainly concerned with such aspects of the theory which offer insights into the differences in performance between individual speakers of the same group, i.e. sharing the same linguistic background. The first language is the same, so is the second, target language; thus, the same linguistic conditions for interference obtain, and yet there is high variability in the overall proficiency, or in particular aspects of the target language: in our case, it is the variability in acquisition of the phonetic parameters used in the second tongue.

A clear definition of the variables of pertinent importance to the second language acquisition serves two purposes: it sets guidelines for the research procedures into the second language production on the one hand, and offers the basis for practical application in formal and informal language instruction on the other. Insofar as we exclude the individual language systems, our search for the sources of variation can be speaker-in-

ternal or speaker-external. In other words, it is the influence of the outside world that causes variation, or/and certain characteristics of an individual speaker's mind and emotions that modify his/her linguistic performance.

The close relationship between social and psychological factors is present in the socio-psychological approach developed by Lambert (1967, 1968), who stresses the fact that the development of second language proficiency has important implications for an individual's self-identity. He distinguishes attitudes, i.e. attitudinal reactions to the language use within or across communities, from aptitudes, i.e. cognitive abilities, intelligence, etc., and orientation, i.e. the reasons for learning the language. Attitudes and orientation are responsible for the level of motivation to learn the target language; aptitudes, attitudes and motivation are claimed to have a direct impact on the development of language proficiency.

When proficiency of the second language reaches a high level, it is believed to have an influence on self-identity of the learner, resulting in additive or subtractive bilingualism, depending on the intergroup relations. If the proficiency in the second language does not entail the reduction of the first language importance, or its replacement, the resulting bilingualism is called additive, i.e. positive for self-identity; the second language proficiency seen as a threat to the first language results in subtractive bilingualism, which may lead to the loss of cultural identity or alienation.

Second language acquisition is viewed as one aspect of a general process of acculturation of a non-native speaker of a language in the target language speech community in Schumann's theory. Acculturation and second language proficiency are determined by the distance between a learner and the target language speech community. A number of social and psychological situations which determine social and psychological distance are recognized, e.g. social equality between target and second language groups functions as a positive factor, reducing the distance, whereas the lack of social equality increases the distance. No culture or language shock is a psychologically positive factor, while the experience of culture or language shock increases the distance, acting as a negative factor (Schumann, 1978; McLaughlin, 1987).

The main factors influencing the variability in second language acquisition according to Schumann are the following:

(1) Affective variables in acculturation:

- Language shock
- Culture shock
- Motivation
- Ego-permeability

(2) Social variables in acculturation:

- Dominance
- Integration strategy
- Enclosure
- Cohesiveness
- Size
- Cultural congruence
- Group attitude
- Intended length of residence

The two types of variables: social and affective are jointly treated as 'acculturation' variable in this model. Social factors operate on a group level, in contacts between speech communities. The individual variables can be seen as modifying factors acting against the group ones. The social factors determining second language acquisition on the group level include social dominance, integration strategy, enclosure, size, cohesiveness, congruence, attitude and intended length of residence. Affective variables are language shock, culture shock, motivation and ego-permeability.

In Schumann's formulation of the conditions for second language acquisition, psychological distance dependent on the value of affective variables for individual speakers is a major factor. However, the social environment of the second language, i.e. social conditioning, although independent of the speaker, forms conditioning factors for psychological conditioning. Clearly, it is the influence of social factors that decides about the psychological distance.

Both Lambert's and Schumann's models are concerned with second language acquisition in natural settings, understood as an everyday contact with the native speakers of the target language in non-instructional situations. They stress the importance of the relationships obtaining across individual communities which the learner belongs to, and between an individual learner vs. each community. However, these relationships are viewed

as relatively stable, static conditions determining the process of second language acquisition. In providing the tools for the formulation of certain predictions about the degree of proficiency as the function of social/psychological distance or attitudes, orientation and aptitude, the theories fail to account for a constant process of negotiation in language use, the relativity of group membership and self-definition of group membership.

Another model of second language acquisition rather than language use, concerned with the final outcome of the process in the form of the level of competence reached by the learners, has been proposed by Gardner (1979, 1983). His work, based on his and Lambert's experience, incorporates some of the issues already discussed here; however, the model has socio-educational basis, i.e. it assumes relevance to both formal and informal language acquisition settings.

The main claim of the model concerns the importance of social milieu, i.e. cultural beliefs, in determining the relative importance of individual differences, such as intelligence, aptitude, motivation and so on. These individual factors have an impact on the development of bilingual proficiency, depending on whether the learner has experienced formal language learning or informal language experience. The importance of individual attitudes as major variables stressed in all the above mentioned models as well as the relationship between social and psychological factors gives ground to the prediction that grouping of subjects on the basis of social variables allows certain predictions as to the value of affective variables. Consequently, the native speakers of Polish whose English speech production is investigated in the course of our experiment can be divided into two groups on the basis of social conditioning (e.g. integration strategy, enclosure, cultural congruence), and certain predictions as to the nature of affective variables can be made. The distance between each group and the majority language community can be expected to depend on the value of social and psychological variables.

However, before the discussion of the socio-psychological variability can be attempted we need to establish the existence of linguistic correlates of this variability. These correlates are referred to as sociolinguistic markers.

1.2. Social Marking in Speech

As already mentioned, speech as a phenomenon can be analysed from various perspectives, depending on the objectives of the study. Analysing speech from a purely linguistic standpoint, we are mainly concerned with aspects of the signal as the carrier of the message. However, as it is not possible to divorce the referential meaning from the information about the speaker's individual and social identity encoded in the signal, the discussion of the clues for attitude formation, which underlie communication in a social context, forms an integral part of the speech oriented research. Insofar as we accept the idea of language being part of a system of social norms, a background against which an individual can act and vary within certain limits (Sapir, 1927), we take a sociolinguistic view. A social psychological perspective, on the other hand, affords the possibility of concentrating on the process of attitude formation.

It was already in 1929 that Sapir noticed the need for interdisciplinary study of linguistics; his statement, quoted by Briere (1980) in the paper discussing the problem of communicative competence, variable rules and interdisciplinary research seems not to have lost its relevance today: "Linguists ... are often accused ... justly, of failure to look beyond the pretty patterns of their subject matter They must become increasingly concerned with the many anthropological, sociological and psychological problems which invade the field of language" (Briere, 1980:89, cf. Sapir, 1929:214).

As Briere (1980) notices, at the same time when Chomsky claimed that "linguistic theory is primarily concerned with an ideal speaker-listener, in a completely homogenous speech community, who knows its language perfectly and is unaffected by ... irrelevant conditions (Chomsky, 1980:3), Gumperz (1968) introduced the notion of different repertoires available to various members of speech community. Shortly afterwards, Fishmann (1978) introduced the concept of 'domain' (home, school, church, etc.), and Dell Hymes defined the notion of 'communicative competence' which complements Chomsky's concept of purely grammatical competence by adding a functional perspective.

Interdisciplinary studies of linguistics focus on variability in speech: the variability within monolingual communities, bilingual/multilingual communities, within one speaker, and across speakers of the same, or different speech communities. Influenced by the investigation of socially conditioned variability in phonology and phonetics of the first language by Labov (1966, 1972), the research into the sociolinguistics of the second language variability was begun in early 1970s, and has been continued by a growing number of researchers (Dowd, Zuengler, Berkowitz, 1990).

The central domain of sociolinguistics can be defined as the “variety and diversity of language related to the social framework of its speakers” (Loveday, 1982). Thus, the sociolinguistic perspective points to the study of linguistic markers providing social information: in the study of speech signal, these are the components of what is generally referred to as accent. Understood as a set of systematic pronunciation variables, or systematic differences in acoustic properties of speech sounds of a given language (Wells, 1982), accent is a subject-matter of sociophonetics.

The social aspects of being bilingual or multilingual, a very important issue for the users and learners of non-native languages, have been extensively studied by sociolinguists. The study has concentrated on minority groups in different countries, the conditions for social acceptance and language maintenance, the problem of ethnic identity and solidarity. The theories which seem most insightful for the second language acquisition conditioning in the bilingual situation are based on Lambert’s social psychology model of second language acquisition (Lambert, 1967) as a precursor: the before-mentioned Schumann’s theory of acculturation, and the Accommodation Theory proposed by Giles and associates (Giles, Bourghis, Taylor, 1977).

The phenomenon of style-shifting and social marking in the second language of bilingual speakers has been noticed at different levels of proficiency, even at the beginning level (Beebe & Giles, 1984). Consequently, the dynamics of speech variation needs to be included in all types of second language studies if we want to be able to interpret the second language production in a systematic way and draw any conclusions from the variation inherent in it. The explanatory theory which seems very insightful in this respect is the Accommodation Theory proposed by Giles and associates (Giles, Scherer & Taylor, 1979).

The model is based on the claim of social psychology that sociolinguistics should not limit itself to the discussion of the reflection of large scale sociological categories of the language; there is a need for an integrated model which would combine sociolinguistic variables with such social psychological variables as interlocutors' feelings, motives and values, their perception of each other and the interaction in general. In this sense, Accommodation Theory can be viewed as an extended version of Schumann's concept of relatively fixed social and psychological distance, enriched by the idea of dynamic relationship between interlocutors, whose feelings of social and psychological proximity fluctuate all the time.

The observation that people tend to adjust their speech in order to express their values and intentions has led to postulating two terms for two distinct types of style shifting: convergence – the speaker style-shifts towards the interlocutor; divergence – the speaker shifts away from the interlocutor, employed in order to maintain or assert distinctiveness. Divergence tends to occur when intergroup categorization is explicit, provoking a threat to distinctiveness or identity (Beebe & Zuengler, 1983).

Speech is believed to contain social markers operating at two levels (Giles, Schrerer & Taylor, 1979). Level 1 is argued to serve to categorize speakers at a general biological or social level; the level 1 markers convey information about gender, social class, ethnic group or physical size. Level 2 markers reflect such more subtle and changing states as beliefs and motives. The evidence for the existence of two levels of marking in speech comes from the studies of Beebe (1977), Beebe and Zuengler (1983), Zuengler (1988), but there is a need to conduct further studies in order to determine the relationship between social markers in the pronunciation of a language as the first or the second one.

The studies conducted by Berkowitz, Dowd and Zuengler (Dowd, Zuengler & Berkowitz, 1990) point to the use of social marker of English used as the first language, such as consonant clusters, dental fricatives and /r/, in English as the second language. The use of /r/ as a social marker in L2 English was evident in all three studies, whereas consonant clusters proved to be social clusters in the first two studies mentioned above. The case of /r/, consistently appearing as a marker in the studies, suggests the tendency for some sounds to be more likely to function as social markers

than others. There is hardly any way to predict which sound will play this role. According to Trudgill (1981) sounds produced with the greatest consciousness by native speakers tend to undergo shifts, i.e. become markers, referred to as stereotypes by Labov (1972).

However, the degree of consciousness involved in the choice of markers can vary. Dowd, Zuengler and Berkowitz (1990) suggest that Trudgill's claim covers only the most common markers, whereas other markers operate on a less conscious or unconscious level. According to Giles, Schrerer and Taylor (1979), both prosodic and phonetic variants can carry social meaning. The nature of phonetic data, the continuity of the investigated signal posits problems with assessment of the L2 production i.e. the judgment concerning the degree of conformity of a given sound with the L1 norm. The range of acceptability is necessary in order to render our judgment as to the closeness of a given sound to the L1 sound reliable. Moreover, we need to know the range of acceptability and the value judgment for the comparable L1 production.

An effort has been made to meet the conditions mentioned above in the present study. The L2 data elicited according to the Labovian attention-to-speech paradigm, have been examined across groups, the value judgment has been based on the comparison to the control group of native speakers of English, i.e. L1 users. The markers were chosen on the basis of two salient features causing variation in L2: interference and social conditioning. Interference is believed to be responsible for the strategies in the acquisition of new and similar phones (Flege, 1987, 1995, 1997); social conditioning, on the other hand, determines the choice of a particular set of phonetic features marking a category.

We shall motivate the choice of individual markers in Chapter Two: phonetic parameters judged as marking features of 'Polish English' are assumed to have a marked function in second language English spoken by native speakers of Polish on the basis of the speakers' consciousness of their importance for native-like production of English. The existence of two types of marking in second language speech is assumed to correspond to two types of group relationships in further discussion. Level one markers are assumed to correspond to the markers used by all Polish subjects in their English production; level two markers, on the other hand, reflect

attitude differences between the members of two groups of Polish subjects taking part in the experiment.

Chapter Two

The Socio-psycholinguistic Hypothesis

The present study of chosen phonetic parameters in the second language speech production focuses on the investigation of the data elicited from native speakers of Polish living permanently in Great Britain and using English in everyday life as their second language. As the study uses the sociolinguistic approach the subjects have been divided into two groups on the basis of socially and psychologically conditioned factors. The phonetic variables have been chosen on the basis of temporal feature comparison between the two sound systems: Polish and English.

The presentation of variables in this chapter is organised as follows: the motivation for the division of the members of Polish-English minority speech community into two separate groups is presented in section 2.1; section 2.2. is devoted to the presentation of sociolinguistic hypotheses to be tested in the course of the phonetic experiment; the phonetic parameters to be used in order to test the sociolinguistic hypotheses are introduced in section 2.3.

2.1. Poles in Britain: a short story of a bilingual community till 1980s

For the purpose of this study, Polish speech community, understood as a group of speakers who share a set of rules and norms for the use of language(s) (Gumperz, 1968), has been divided into two ethnic groups: each of these groups constitutes a separate network within the community of Polish-born speakers of English in Britain.

The notion of a speech community as defined by Gumperz and used by Labov (1972), assumes unidirectionality of variation observed within the community. Labov's model of variation assumes that speech communities share both rules of the grammar and the norms for using them. A given variable is claimed to be used in the same way by all social groups, only to a different extent; the community thus defined is referred to as "prototype variable rule community" by Romaine (1982). The notion of social network as the type of grouping below the level of speech community (Milroy, 1980, 1987), seems very useful in the account of the structure of Polish speech community in Britain: the variability in the second language production cannot be predicted to be unidirectional due to the linguistic, social and psychological factor diversity.

The two groups recognized in the study undoubtedly belong to the Polish speech community: the first language has been and still is Polish, used according to the same general norms and rules. Not only is Polish still maintained, but in fact the level of proficiency in the first language can be claimed to be very high on the basis of education received in this language and/or occupation requiring the use of the mother tongue with a certain degree of sophistication¹. The members of both groups faced the status of immigrants, linguistic minority members within the majority English speech community, in early adulthood, i.e. between the age of 23 and 30. Furthermore, the choice of Great Britain as the place of permanent residence has been influenced by political as well as economic reasons in all cases.

Notwithstanding the factors shared by the community, it is claimed to function within two separate social networks: not only the generation gap, but also politically and socially different background keeps the two groups distinct. The attitude towards the majority speech community and the assessment of the relationships between the two communities, as well as the value judgments differ to a considerable extent. Although an obvious in-

¹ The degree of proficiency in the first language has not been investigated in a formal way in the course of the present study; however, the self-reports of the subjects on their education and occupational status, as well as the domains of the first language use have been elicited in the course of the conversations held by the author with each of the subjects in the period prior to the experiment.

dividual variability can be observed, the number of factors shared by each group seems to justify the claim concerning their functioning within two networks included in the Polish speech community in Britain.

Group I, referred to as “old immigration” (post-war), consists of people advanced in the age at the time of the recording, who came to Great Britain during or immediately after World War II; Group II, “newer immigration” (post-Solidarity), comprises people in the age group between 25 and 35 at the recording time, who arrived in Britain, and subsequently decided to settle there, between 1980-1982.

2.1.1. The Story of Post-War Polish Immigration to Britain: some dates and numbers

The saga of Polish migration to Great Britain during World War II and the subsequent period is very colourful, but difficult to specify in terms of exact figures. The number of residents with Polish nationality in England and Wales according to the 1951 Census was estimated at 130,000²; with the numbers accounting for Polish residents in Scotland, the overall number for that year would be about 142,000 (Sward, 1987). The period preceding the Census shaped the size, demography and characteristics of the Polish community in Britain.

Polish ethnic minority was the largest single post-war ethnic minority in Great Britain. About 90 - 95,000 Poles are believed to have been in Britain at the end of the war; 200,000 out of 250,000 Poles in Allied Forces came to Britain in the period between the end of the war and 1947 (Czaykowski and Sulik, 1961). Not all of them settled in Britain; some decided to re-emigrate to the U.S.A., Canada, Australia, etc., some went back to Poland in spite of the political development. For those members of Polish forces in the West who stayed in Britain, Polish Resettlement Corps was organized with the purpose of facilitating the beginning of new life in a new place. About 114,000 Poles joined the Corps and went to live in more than forty

² The exact figure quoted by Sward is 163,000; however, the heading used in Census: “Residents of England and Wales by Nationality, born in Poland” gives grounds to the belief that the data include many Polish-Ukrainians. When the question is about nationality, Polish nationals number 130,865. For further data and analysis see Sward (1987) and Zubrzycki (1956).

camps organized throughout Britain, in the places where accommodation and work were available. Most camps closed by 1960; in the period of their existence, they provided assistance in education, employment and housing.

The post-war Polish ethnic minority in Britain consisted mainly of the ex-military personnel of the Polish units serving within Allied forces, their family members (about 33,000), European Voluntary Workers (about 14,000 from the Displaced Persons' Camps in Germany), survivors of the German concentration camps and prisoners of war (about 2,000 and 21,000 respectively).

The origin of the community resulted in a considerable imbalance in the sex structure: on 1st December 1951 there were 135,770 Polish nationals registered as aliens residing in Great Britain of whom 101,284 (74.4%) were men and 34,486 (25.6%) were women. Zubrzycki (1956) quotes the figures, suggesting that they be viewed with caution, as the proportion of women varied considerably between different localities. The area breakdown at Home Office points to a slightly higher proportion of Polish females in Greater London: 23,244 (69.5%) males to 10,208 (30.5%) females (Sward, 1987). The areas where large housing estates were available, e.g. Gloucestershire, attracted a higher proportion of women – 42% of registered Polish aliens.

The pattern of distribution has been largely dependent on the combination of two factors: accommodation and occupation. The regional settlement pattern had been generally established before 1960, i.e. the year when almost all camps closed down³. The largest group of Poles settled in London – 30,000 to 35,000; industrial towns of Britain were the main settlement areas outside London: Birmingham and Manchester had about 4,000 – 5,000 Poles each, Bradford about 3,000; Leeds, Nottingham, Sheffield, Coventry, Leicester, Slough and Wolverhampton between 1,500 and 3,000 each.

The first, by far the largest Polish immigrant wave was followed by a constant trickle of Polish immigrants, mainly women. During the pe-

³ According to Patterson (1977), by 1976 only one camp remained, and it was owned by a Polish organisation.

riod between 1955 and 1970 about 13,000 Poles, mainly women, settled in Britain, between 1972 and 1975 75 another 2,600. The 1971 Census speaks of 110,000 people of Polish nationality born outside Great Britain (Patterson, 1977). The comparatively slow increase in the number of new Polish immigrants continued till the late seventies; the situation changed radically in the eighties, when the dramatic developments in Poland resulted in another large wave of immigrants seeking political and economic freedom in Britain.

The occupational structure of post-war Polish immigration is largely unknown; however, the data from the Polish Resettlement Corps referring to 102,000 members, indicate that about one fifth of them were in various non-manual occupations. Among the ones in manual occupations the largest group was employed in the building industry (9,000), agriculture (7,300) and mining (7,300) (Czykowski and Sulik, 1961). There was a group of professionals who had qualified in Poland, e.g. teachers, doctors, dentists, pharmacists, engineers, lawyers, artists and clergy. Some of them managed to find occupation in their profession: by 1958, 600 Polish doctors, 80 dentists and about 2,000 engineers practised their profession in Britain. Other professionals, such as lawyers or architects, found re-qualification more difficult; nevertheless, many of them succeeded, some with the aid of grants for higher education received from British authorities (about 10,000 younger Poles received the grant in the period between 1947 and 1960).

The existence of the Polish Resettlement Corps and the official recognition of Polish immigrants by the British authorities notwithstanding, the position of Polish immigrants was far from advantageous for several reasons. Most of the new immigrants had no or very little knowledge of the English language, English people and the English way of life. Their previously possessed skills, education and experience proved useless in most cases. Having spent several years in the army, having experienced hardships of war and post-war political development practically banning them from their country, their homes and families, they were to try to start new life in a strange country which did not make them feel welcome.

The hostile attitude on the part of the British society manifested in the late forties undoubtedly influenced the relationships within the Polish com-

munity and cross-community ones. The problems with finding occupation were enhanced by an overtly hostile attitude of the Trade Unions towards immigrant workers in general, and Polish workers in particular. During the Trades Union Congress in 1946, Poles were envisaged as Fascists and reactionaries, living idle life for the British taxpayers' money; it was claimed that Poles presented a threat to the English community as rivals to jobs, housing and food. In an effort to guard the trade union member privileges, the limit of foreign labour (the so-called 'quotas') was set at the level of 10-15% per company. All this was happening in the period of sharp labour demand in Britain, when the decision about hiring workers from Europe was taken (Kransz, 1971).

In spite of the high proportion of qualified people, most members of Polish community began their career in the new country as unqualified manual workers. The occupational adjustment was particularly difficult for Polish intelligentsia, who suffered considerable occupational degradation, especially the older members of this group, often unable to pass the qualification exams and face competition (Zubrzycki, 1956). It is noteworthy, however, that regardless of the initial stage in the career, many Poles tended to improve their status over time. In the descriptions of workers offered by employers and cited by Patterson (1968), Poles appear to be reliable, hard working, ambitious, but clannish, sticking to each other and not easily mixing with non-Polish colleagues.

Generally speaking, Poles have been very active; according to the data from the 1966 Census, Poles had the highest proportion of economically active people: 65%, as compared with an average of 60% for other minorities, and 47% for the total population of Britain (Stubbs, 1985). There was a relatively small proportion of war-disabled or elderly persons who could not support themselves and relied on the 'public purse' (Zubrzycki, 1956).

The majority of older pre-war intelligentsia became occupationally declassified, the attitude of the 'outside world' was felt to be unfavourable, which consequently led to the strengthening of the within-group relationships. More than a hundred Polish organisations have been established, channelling the energy and ambitions of many otherwise declassified people; the external factors in combination with the internal ones, have produced strong ethnocentric feelings.

The largest and the most influential organisation, Polish Ex-Combatants Association (Stowarzyszenie Polskich Kombatantow, SPK), has been based on preserving the war-time comradeship; however, its later function greatly exceeded the initial aim: the Association provided financial and legal help, cultural facilities and social activities for its members. Moreover, as the organisation uniting Polish political emigrants all over the world, it offered material assistance and ideological help to the cause of national independence and Polish culture (Patterson, 1977). SPK has been active in keeping up Polish Saturday Schools teaching Polish throughout Britain (there were 88 such schools in 1975), Polish parishes, Polish Scout and Guide movement and the Association of Polish Sports Clubs.

Last but not least, the role played by the Polish Parishes needs to be mentioned. According to the statistics of the Polish Resettlement Corps from 1948, nearly 86% of Poles were Roman Catholics⁴. In his report concerning the study of “The Other Language of England” (1985), Stubbs says that the 1984 Polish Daily’s Diary lists 51 Polish Parish Houses in 44 different towns and cities of Britain, including 8 in London, and 114 priests.

The research mentioned above and conducted by London University under the supervision of Verity Khan, brings another interesting piece of information supporting the ethnocentric and generally distrustful attitude of the Polish community towards the English community on the one hand, and the influence of the Roman Catholic church on the other. During the research, inhabitants of Coventry and Bradford were asked to answer a questionnaire. The researchers addressed the members of various ethnic minorities; the highest proportion of refusals to participate came from the Polish communities in both towns (17% negative answers). The authors of the report explain this result with a combination of two factors: a high degree of isolation, mistrust of British authority in the Polish community and the difficulty which they experienced in publicising the project together with the lack of support on the part of the local priest (Stubbs, 1985).

⁴ As Patterson notices, this figure differs from the pre-war picture of Poland, where only 65% were Roman Catholics. The difference is explained by Davies (1981), on the grounds of the circumstances under which Second Polish Corps was created in the Soviet Union from the released Soviet internees.

2.1.2. Solidarity period immigration: how was it different?

In 1981, the dramatic political development in Poland once again bore fruit in the rapid increase of the number of people abandoning the old country in the quest for political and economic betterment. Great Britain proved to be one of the most obvious destinations for Polish people seeking settlement outside Poland: the tradition of Polish - British relationships, the existence of the Polish government in exile in London at that time, the political views of the British Prime Minister, Margaret Thatcher, believed to be strongly opposed to communism and the domination of the Soviet Union, and most of all the presence of a well-organised and helpful Polish community, acted as driving factors for numerous people leaving Poland.

The data concerning the then 'new immigration' are extremely scanty; in the present discussion, we will rely on the information received in the Polish Social and Cultural Association in Hammersmith, London, the information supplied by the representatives of new immigrants in the course of numerous discussions held by the author⁵, enriched by the opinions and experience of the members of the first group of immigrants, i.e. the 'old immigrants' in relation to the 'new' ones.

According to the estimate of the representatives of the Polish Social and Cultural Association, the group of Polish people who had been in Britain before 13th of December, 1981, on the basis of tourist visas, and who applied for residency in Britain when martial law was declared in Poland on that date, constitutes the second largest group of Polish immigrants in Britain. The majority of these Poles were young, in their twenties, many of them students, who had come to Britain for several months, in order to visit their relatives, to earn some money badly needed back in Poland (mostly without a work permit, but seldom actively prosecuted for illegal work on the basis of the student status); their situation changed literally overnight.

⁵ Some of the new immigrants whom the author had the pleasure to meet in London in 1986/1987, agreed to act as informants for the experiment; many others, however, were reluctant to undertake the task of speaking English in a highly monitored situation, which the recording of their speech would provoke. The author has been keeping in touch with many of the informants, trying to receive up-to-date information on their status and opinions. However, the overall number of informants has not exceeded 30, 12 of whom agreed to take part in the experiment.

Suddenly, they were in the position when the decision concerning their return to Poland was no longer obvious; deeply worried and distressed, watching the tanks in the centre of Warsaw on television, the military units attacking the civilians, hearing about the prosecution of the Solidarity leaders and members, they experienced anger and despair. All hopes for freedom and democracy, let alone well-being in Poland were shattered and seemed finally destroyed. Some of them took the decision that they would not go back to Poland immediately, for others it was a lengthy process, but they all believed that they would be allowed to settle in Britain by British authorities.

It is very difficult to judge the motives of the new immigrants; the political and economic reasons for choosing emigration have been interwoven in most cases. The status of a resident in Britain gave a prospect of legal work and improvement in the socio-economic position; none of these people favoured the communist regime in Poland, and in this sense they all felt they were in the opposition, even if not actively involved with it. The expectations were high, in some cases verging on the demands to the British authorities to fulfill what was felt to have been a moral obligation on the part of the country which encouraged anti-Soviet activities. However, regardless of the precise proportion of political and economic reasons for emigration, the new immigrants soon learnt the lesson which the old immigration had experienced long ago: emotions do not enter British politics.

The legal situation of new immigrants had been uncertain for another decade: it was only in the late 80s that most of them were granted permanent residency. The work permits not always proved to be beneficial: in some cases, the employers were reluctant to employ as a legal worker the same person who had worked illegally, as this would mean higher wages and official costs. There were few openings in higher prestige occupations than the typical cleaning or bar tending jobs which they used to take. Just as in the case of 'old immigration', their previous education had little value under new circumstances.

Although the difficulties cannot be ignored, the general position of 'new immigrants' needs to be recognized as considerably easier from the point of view of adaptation prospects. The new immigrants took the decision of settlement having had the previous experience of the country which they

chose; although they often stress the lack of real choice and claim inevitability of their decision on political grounds, their position cannot be compared to the real loss of the motherland and the prospect of deadly prosecution on return to Poland which most of the 'old immigrants' had to face.

The new country must have seemed much friendlier to the young Poles of the eighties than to the war-exhausted ex-soldiers in the forties. The position of young Poles did not radically differ from the position of other immigrants or even other young British people from less privileged background. Britain of the eighties regained much of her earlier splendour and financial stability, the British were more inclined to show sympathy and help to newcomers from the country which was currently in the news.

Many new immigrants recognized the need for education and linguistic proficiency in English as the basis of further success. For some, former students of Polish universities, it was the obvious continuation of an accepted way of life, the major difference being the need to rely on themselves rather than on their families. They were extremely proud of newly found independence and self-reliance, they had ambitious plans and tried to find best means of realizing them. The often repeated plan was to stick to any job that paid enough money to live on but did not demand long hours, so that studying was possible. Studying might mean anything from afternoon language classes to university, but the tendency to get some sort of education in Britain was fairly common and typical of this group.

The new immigrants could count on help of the 'old immigration' both in institutional and private form. Many of them found accommodation with Polish landlords, Polish newspapers carried numerous job advertisements and scholarship information and gave a general guide to the social life of Polish community in London, which the new immigrants were welcome to join. Gradually, however, the differences between the two groups became apparent: a growing feeling of mutual distance and a certain degree of distrust appeared.

The new immigrants concentrated on improving their position in the British community; the identification with the Polish ethnic minority group seemed obvious to them, but not necessarily advantageous. Not feeling rejected by the majority community, they did not develop strong links with the minority community. The age difference, different attitudes and tradi-

tion were reflected in referring to Poles as either 'Polish', i.e. belonging to the Polish community in Britain, or 'from Poland', i.e. newcomers from Poland. Hoping for a success in the British community, working for becoming fully accepted by this community on an equal basis but not identifying with it on the one hand, and trying to get away from the ethnocentricity of the Polish community, but never rejecting it on the other, 'new immigrant' form a distinct network within Polish speech community. Although nationally conscious, some tend to view the nationality as a burden rather than an advantage. In the course of discussion about work prospects, one of the informants said that using the help of traditionally Polish organizations limits the choice and hinders professional career. The respondents who reached acceptance and success in the majority community tend to express the strongest national identification in this group.

The intergroup relations reflect the relationships between the minority – majority communities in both groups. It seems reasonable to claim that whereas 'old' immigration built strong minority bounds before facing the majority community, the 'new' immigration reversed the process, requiring functioning within majority community before entering into strong ethnic relationships. The two tendencies are by no means exclusive, i.e. they should be understood as tendencies rather than regularities. The members of each group have their own individual stories and experience shaping the identification patterns.

The attitude towards ethnicity bears a direct influence on the attitude towards the host community: the question of the relationship between the attitude formation and the acquisition of the language of the host, majority community, is going to be in the focus of our attention in the following part of the present chapter.

2.2. Second language speech production depends on the attitude towards the target language speech community

The claim underlying the present study concerns the relationship between the attitude of the language user towards the community using this language and his/her speech production. In the case of native speakers of Polish speaking English in the situation when English is the majority lan-

guage in a given setting, the ethnicity of the speakers, their beliefs and attitudes are believed to be reflected in the language use.

Taking the decision about the stay in a new country invariably means entering into the bilingual world. Although Fishman (1978) believes that monolingualism is a myth fostered by centuries of Euro-Mediterranean linguistic experience and claims that bilingualism, or indeed multilingualism is a much more common phenomenon, the Poles tend to find their bilingual experience often difficult, although educational and enriching. The relationship between the two languages: Polish and English, suggests a case of subtractive bilingualism, caused by a strong dominance of English speaking society over the Polish one. Regardless of the possible danger of first language loss, the bilingual situation means the existence in two worlds, functioning within two distinct language communities. The definition of a bilingual which we will accept after Loveday (1982) reads as follows: “a bilingual is someone who can function with a degree of efficiency in two language worlds”; there is no requirement on the degree of proficiency allowing one to function as a bilingual: the non-fluent L2 user can be considered “a more typical, if not ideal, representative of bilinguals” (Loveday, 1982).

The use of the spoken language by Polish-English bilinguals living in the U.K. is claimed here to be affected by the attitude of the speaker towards the majority language speech community / target language community⁶. This section formulates the socio-psychologically motivated hypotheses that will be tested against the data collected in the in the course of the sociophonetic experiment conducted among the two groups of Polish immigrants to Britain.

2.2.1. Weak hypothesis: a non-directional relationship

The first sociolinguistic hypothesis to be tested in the course of the present study concerns the verification of the claim that the two groups

⁶ The terms: ‘majority language speech community’, ‘target language speech community’ and ‘L2 speech community’ are often used interchangeably; however, the first term, as a sociolinguistic one, suggests that the community should be treated as a social phenomenon, whereas the second and the third imply focusing the attention on the acquisition and use of the second/target language from the learners’ perspective.

of Polish immigrants described in the previous section form two distinct social networks. The socio-psychological differences between the two groups are assumed to be reflected in the second language speech production of their members. The hypothesis will be verified on the basis of the phonetic implementation of a phonological contrast, investigated by means of phonetic parameters used in the implementation of a phonological feature [voice].

In the weak version of the hypothesis we do not predict the type of influence which is exercised by the above presented group attitudes on the speech of a given group members. The claim concerns the existence of such a relationship, i.e. the empirical verification aims at proving or disproving the hypothesis that the degree of acceptance and identification with the linguistic community whose language is acquired conditions the tempo and quality of this language acquisition and language use.

It has been claimed that at the socio-psychological level, the degree of success in the second language depends not only on the attitudes of the learner towards the second language community, but also on the personal feelings about ethnic identity (see Chapter 1.2.). The two basic motives for learning/becoming proficient in the second language are the desire to be better educated, upgrade one's chances for better occupation, higher status, and the motive to learn more about the other language and cultural community, expressing the desire to become a member of this community (Lambert, 1968). The former motivation has been labelled 'instrumental', whereas the latter 'integrative'. It is the latter type of motivation which has been shown to be more successful in attaining a high level of language proficiency in an immigrant setting (Gardner and Lambert, 1972).

The theoretical socio-psychological models which form the basis for the present hypothesis are the before-mentioned (see chapter 1.2) Acculturation Model proposed by Schumann (1978, 1986) and social psychological 'cultural milieu' model advocated by Gardner (1979, 1983). Both models represent a static attitude towards the second language actual production at a given moment; their main concern is the acquisition rather than the use of the second language, which is viewed as the target, ultimate non-variable version of the language. Such an attitude towards the target language implies a strong emphasis on a standard, 'high' dialect of this language.

Consequently, the influence of dialectal differences, both regional and social, is not considered relevant in the assessment of the degree or the process of acquisition of the second language.

In Schumann's model, the social factors which determine the extent of acculturation and thus the extent of second language acquisition are the variables which operate on the group level to mediate the contact between the two language communities; the variables involve the relationship between the social groups in contact, each of which speaks a different language. The attention is focused on collective relationships; an individual is affected by them only to the extent to which he/she is influenced or constrained by the social parameters of the model.

The social factors included in the model are the following:

1. Social dominance: the degree to which one group is politically, culturally, technically, or economically superior.
2. Integration strategy: the preservation, assimilation or adaptation relations between groups.
3. Enclosure: the degree to which secondary social institutions such as churches, schools, clubs, etc., are shared by the two groups.
4. Additional factors: the group size, cohesiveness, cultural congruence, attitude and the intended length of residence.

The power relation between the two groups is a starting point for identification of other social factors: the higher the degree of equality between the groups, the more extensive the contacts leading to more frequent occasions for language experience leading to acquisition. Conversely, the greater dominance on the part of one group, the greater the distance between them. The second social factor concerns the degree of integration between the groups: the preservation strategy, maintaining the group's own customs, life styles and values with simultaneous rejection of those of the other group, the distance between the groups discourages language contact and consequently, negatively affects the process of second language acquisition. Both assimilation and adaptation strategy encourage second language acquisition; in fact, the model does not assume the primacy of assimilation strategy, i.e. abandoning one group's own way of life and adopting the second group's lifestyles and values, over the adaptive, i.e. joining the features characteristic for each group.

The type of integration strategy followed by a group is claimed to function as a critical determinant of second language acquisition; the other social factors are closely related to this one. The degree of enclosure depends on the strategy chosen: if the group adopts the preservation strategy, the tendency to maintain separate churches, schools, etc., prevails. If, on the other hand, the groups share many institutions, the enclosure is low and there are more contacts between the groups, encouraging second language acquisition. The size of the group, cohesiveness, and intended length of residence largely influence the choice of integration strategy: the larger and more self-sufficient the group, the less intergroup contact can be expected. The degree of congruence between the groups and the attitude towards each other encourages second language acquisition to the extent proportional to the positive value of the factors.

Social factors form a general frame of group relations, against which an individual can act, superseding the unfavourable social circumstances or militating against the favourable ones. The affective variables influencing second language acquisition and use are the following:

1. Language shock, resulting in fear to appear comical when trying to use another language.
2. Culture shock: the uselessness of previous coping mechanisms, problem-solving strategies, etc. which may discourage an individual from the new culture and provoke falling back on the original culture.
3. Motivation, instrumental or integrative.
4. Ego-permeability, referring to a concept related to the Freudian „body ego” and claiming that each person has a ‘language ego’, the rigid definition of which results in the high level of linguistic inhibitions.

The objectives of the present study fit the model presented above with respect to the fact that the Schumann’s model was developed to account for the untutored second language acquisition in the case of adult immigrants. However, the formal linguistic training to which all subjects had been exposed to some extent before or during their stay in Britain, cannot be incorporated into the analysis based on Acculturation model. An alternative allowing to combine the two types of linguistic experience is offered by the socio-psychological model proposed by Gardner (1979). The model

concentrates on individual rather than group relations, stressing that cultural beliefs determine the relative importance of individual differences.

The non-directional formulation of the hypothesis finds further support in the results obtained in a classical ethnic identification study (Giles et al., 1989), involving 90 ethnically Polish bilingual males, representatives of about 5,000 Polish families living in Ealing, London. The study was concerned with the effect of subjective definitions of ethnic group membership on value expression, and not the effect of objective, external factors. Three groups of informants were tested, divided on the basis of the level of Polish cultural identification: High, Medium and Low Poles; the Rokeach Value Survey was administered randomly in either Polish or English. The factors in the analysis were the following: 'spirituality', 'traditional / conservative responsibility', 'liveliness of mind', 'freedom and family security', and 'self-satisfaction'.

The first two factors and the last one correspond to the value structure of Polish immigrants, suggested in Nowak (1981) and Smolicz (1981): conservative rather than radical political views, pro - religious values and concern with family, national security and freedom are regarded as the main Polish values, whereas the English values are generally associated with 'hedonistic self - advancement'. In the study, High Poles (i.e. with a high ethnicity value) upgraded 'spirituality' and 'traditional / conservatism' more in the English than in the Polish language; at the same time, the same group upgraded the 'self - satisfaction' factor more in Polish than in English. This result seems to indicate truly bicultural feelings on the part of High Poles, who upgrade Polish values in English, and English values in Polish. The Low Poles, however, tend to converge towards the Anglo values in English. In fact, the results of the ad hoc comparison with 50 male English students yielded "an overriding and provocative tendency for the Low identifiers to over - accommodate this particular host group's values" (Giles et al., 1989 :114).

The relationship between subjective ethnic identification and attitude towards second language speech community seems to correspond to the external factor analysis; the High Poles can be claimed to have developed the adaptive strategy, resulting in the 'best of two worlds' attitude. In con-

trast, the Low Poles try very hard to be ‘more British than the British themselves’, which may be a result of the assimilation integration strategy.

Testing a non-directional hypothesis claiming the influence of social factors on second language production, we will treat the two groups of Polish speakers of English as representatives of two social networks, whose relationships with the English speech community are claimed to be different; our aim is not to predict which of the groups represents the factor combination more favourable for language acquisition, but to prove that the assumed difference in socio-psychological conditioning is reflected in the difference in speech production.

The differences in the social and psychological factors are claimed to influence the second language speech production. The analysis of the major variables, leading to ascribing certain values to the factors in each group, and consequently to the prediction of the ‘better’, i.e. closer to the native speakers’ norm, speech production in one group, will form the basis of the strong, directional hypothesis discussed in the following section.

2.2.2. Strong hypothesis: the directional relationship

The strong formulation of the sociolinguistic hypothesis is based on the assumption that the difference in the values of social and psychological variables between the two groups of Polish speakers of English under investigation justifies the prediction as to which group can be expected to be more successful, i.e. more native – like in their English speech production. The hypothesis claims that given the information concerning the attitude formation in both groups, it is possible to judge the distance between each of the Polish groups and the English speech community, thus deciding about the chances of language acquisition in each group.

Before the final formulation of the hypothesis, let us proceed with the discussion of the individual social and psychological variables included in the two models presented in the previous section: the Acculturation model and Cultural beliefs model in the context of the two groups of Polish immigrants in Britain.

The power relations reflected in the contacts of the two Polish networks with the English speech community establish a clear picture of social dominance of the latter group; the first social factor has the same value for both

Polish groups. The integration strategy, however, seems to be different. Although there is no clear-cut distinction, the preservation strategy tends to prevail in 'old generation', whose members had long believed that the ultimate aim of their stay in Britain is the preservation of political democracy and freedom for Poland, guarding the tradition and culture which the hopefully re-born and free Poland will need one day. The strong ethnocentric attitude coexists with the adaptation strategy employed by many representatives of this group. The generally adaptive strategy of the 'new immigrants', on the other hand, often drifts towards the assimilation pattern, which assumes not only the acceptance of social norms, customs and way of life of the target language community, but also abandoning the way of life and tradition of the first language community.

Assimilation strategy for integration leads to the maximal exposure to the second language; however, the risk of rapid deterioration of the first language may result in linguistically and psychologically negative consequences. The adaptation strategy has been found equally successful for the acquisition of the second language (McGroarty, 1988), without the loss of the first language. The advantage of adopting the adaptation strategy was referred to by one of the subjects as "taking the best of the two worlds". The intergroup relations are based on the acceptance of target language community values and lifestyles, the intragroup relations preserve the first language community tradition, and both worlds are enriched by the elements specific to the other.

The strategies employed by the two groups seem to range from opposite extremes to the middle. However, the preservation pattern prevailing in the 'old immigration' gives grounds to the prediction that the exposure and contact of this group with the target language speech community should be less extensive than in the 'newer immigration' group. Consequently, the 'newer' immigrants should be expected to acquire the more native – like strategies in the target language.

The enclosure factor is strictly connected to the previous one: here again, the newer immigrants tend to share most social institutions with the target language society: some of them shy away from Polish clubs, preferring the English institutions. The church is a general exception: all subjects representing newer immigration said that if they went to church, it was

the Polish one. It is noteworthy, however, that the proportion of regular church-goers among this group is much lower than in the old immigration group. It is not only the Polish church, but also Polish clubs, schools, recreation facilities, etc., that the old immigration tends to choose. The high enclosure gives fewer possibilities for intergroup contacts across domains, as the use of English is often limited to work and television.

The size and cohesiveness of the old immigration, well able to look after its members, forms yet another limiting condition on language contact. The old immigrants have lived in the ethnic communities where most of their needs could be satisfied without the necessity to resort to the majority language help. Polish – dominated areas tend to have a Polish church, a Polish shop, a Polish doctor and a Polish lawyer, or a person able to deal with formal requirements of the authorities.

In spite of the assistance offered by the old immigration to the newer one, the latter has approached neither the size nor the cohesiveness of the first group. The contacts with the target language have been much more extensive since the very first experience of the newer immigrants. The contact has been further encouraged by positive intergroup attitudes, the condition which the older immigrants had not experienced for several years after settlement⁷.

The congruence can be assessed as equally high in both Polish groups, although the availability of information about the British way of life, popularity of the British pop music and fashion with the newer immigrants may have resulted in the feeling of greater cultural closeness than forty years earlier.

The intended length of residence, mentioned as the last social factor for target language acquisition in the Acculturation Model, is very difficult to assess; however, it seems legitimate to suppose that in spite of the actual length of residence known now, their intentions were different: most of the older immigrants believed that the political situation in Poland would change in the near future and they would be able to go back to Poland. At

⁷ The 'new' immigrants experienced a general sympathy and interest on the part of the British people in connection with the genuine admiration for "Solidarity" and condemnation of the martial law in Poland.

the time of the recording, the newer immigrants did not make too many assumptions; however, most of them claimed that they would like to take permanent residency in Great Britain.

The social factors seem to point to the newer immigration as the group more likely to achieve native-like competence in the target language. The affective factors mentioned by Schumann further justify this assumption: the language shock, or fear to appear comical, uneducated, etc; culture shock, or the anxiety resulting from entering a new culture; motivation, more integrative in the case of newer immigrants; ego-permeability, readiness to accept new experience, influence, etc., all give preference in the type and extent of the linguistic exposure and the acceptance of the effects of this exposure to the newer immigrant group.

The overall distance assessment based on the data presented in section 2.1. points to the newer immigration group as the one exhibiting smaller distance to the English speech community. Consequently, the hypothesis can be formulated as follows: the production of phonetic parameters in English is expected to be more native - like in the group of newer, post-Solidarity immigrants than in the group of older, post-war immigrants.

In order to verify the hypotheses it is necessary to specify the phonetic parameters chosen as the markers of English speech performed by Polish native speakers with different attitudes towards the English speech community. The description and motivation for choosing the specific phonological and phonetic features of English as parameters of the 'nativeness' of the second language speech production is the subject matter of the following section.

2.3. Phonetic parameters used for sociolinguistic hypothesis testing

The process of sociolinguistic hypothesis testing involves experimental techniques based on the assumption that the relationships between two types of variability: socio-psychological and phonetic follow a certain regular pattern which can be unveiled in the course of experimental investigation. The choice of particular variables is a decisive factor ensuring that a given experiment design successfully tests the hypothesis.

As mentioned in Chapter One, phonetic parameters chosen for the investigation of the second language speech data collected from a group of native speakers of Polish speaking English represent temporal relationships in phonetic implementation of voicing as a basic phonological contrast implemented by the two languages. Phonetic implementation of this phonological contrast involves different strategies in each language: the same parameters are used differently, or different parameters are employed. The two parameters which do not carry a contrastive function in Polish, aspiration and vowel duration are analysed in the connection with their phonological function in English as well as in the phonetically motivated contexts.

The use of phonetic variables in the verification of the sociolinguistic hypotheses assumes a quantitative analysis of the data, which need to be standardised and statistically analysed in order to test the results for the statistical significance. The methodology follows the guidelines set out by Labov (1972), but the results are claimed to have far reaching consequences for the phonological study of surface phonetic variation within and across languages. When undertaking the study of phonetic parameters in the second language speech production, not only is one faced with the need to investigate into the use of these parameters by the second language group, but also the 'norm' for the use of them established by the native speakers and accepted by the second language speakers as the ideal realization which they attempt to reach. The norm accepted in the present study is represented by the English spoken by the control group, chosen from the native speakers of English speaking the educated southern British English (referred to as Received Pronunciation or BBC English in the British phonetics tradition), which has been the variety chosen by all subjects as the 'best' English which they have tried to learn to speak in the course of their formal and informal language education. The awareness of the standard pronunciation is strongly related to the high level of education of the speakers.

2.3.1. Phonetic parameters used for the implementation of stop consonant voicing in Polish and English

Voicing contrast is employed universally as a basic feature of the phonological consonant systems across languages. However, phonetic implementation of phonological voicing opposition in particular languages involves a combination of phonetic features, some of which are universally predicted for a given cognate, whereas others are language-specific. In the case of stop consonants, the basic phonological opposition is expressed by the use of feature voice in word medial and word final position; word initially, however, two features: voice and aspiration can be used distinctively.

The behaviour of prestressed initial prevocalic stops in different languages can be generalized by means of postulating different categories of languages; Lisker and Abramson (1964) distinguished between a category of languages which contrast voiced and voiceless stops in a post-pausal word-initial position before a vowel (.CV), a category of languages which contrast two types of voiceless stops: aspirated and unaspirated ones, and finally the languages employing a three-way opposition and distinguishing between voiced, voiceless aspirated and voiceless unaspirated stops. Thus the presence or absence of vocal fold vibration may, but does not need to be involved in the phonetic realisation of phonological oppositions of stop cognates; whether it does or not, depends on the phonetic environment, the manner of articulation and a particular language characteristics.

From the point of view of the type of contrast used for the realisation of the opposition between stop cognates, languages can be grouped as follows:

1. Languages which contrast stops which are either voiced or voiceless, e.g. French, Polish;
2. Languages which contrast aspirated vs. unaspirated stop consonants, e.g. English, German;
3. Languages which use the three-way opposition, and contrast voiced vs. voiceless vs. aspirated stops, e.g. Thai, Hausa.

The above mentioned categories are based on the behaviour of stop cognates in a post-pausal, prevocalic .CV context; they seem to be less applicable to the characteristics of other environments. An overwhelming

preference for voiceless unaspirated stops in word initial and word final position in languages suggests the preference for voiced medial stops as a universal tendency. However, it has been shown that languages employ the same type of contrast in initial and medial stop cognates, with the least variation across the positions in category 1 languages (Keating, Linker and Huffman, 1983). The same study stresses the restrictions on final consonants, which are found in languages regardless of the kind of voicing contrasts: the best known type of final stop restriction is that final stops must be voiceless. From the point of view of the stop opposition in word-final position, languages can be divided into two groups: languages which preserve the phonological contrast between the cognates word finally, e.g. English, French, and languages which neutralize the contrast in this particular position, e.g. Polish, German, Dutch.

The two languages which are in contact in the case of the present study, English and Polish, belong to different groups in both cases, i.e. they differ with respect to the implementation of phonological voicing opposition in word initial and word final stops. From the perspective of a Polish native speaker using English as the second language, the acquisition of the word initial voicing opposition in English requires the acquisition of a 'new' phonologically significant phonetic category called aspiration. The implementation of the voicing opposition in word final position requires the modification of the phonological system and suppressing the neutralizing principle in order to preserve the voicing opposition.

A phonological binary opposition between voiced vs. voiceless stop cognates is characterized by a number of different measurable correlates at the phonetic level. The phonetic correlates of distinctive features, or sub-features, have been singled out and defined in the course of phonetic studies of the production data; many of them have also been claimed to function as important clues for the perception of voice opposition. The list of the phonetic sub-features relevant for voicing opposition has been proposed by Ni Chasaide (1985), who stresses the fact that the list is not claimed to be exhaustive and moreover, the relative importance of any of the features depends on a number of factors, including the language under investigation, the phonetic environment of a particular sound in this language, etc.

1. Vocal fold vibration (voicing), synchronous with supralaryngeal articulation;
2. Presence or absence of aspiration.
3. VOT: Voice Onset Time, a conflation of temporal aspects of voicing and aspiration;
4. Differences in closure duration between the two members of the opposition;
5. Differences in the duration of a preceding vowel;
6. Presence or absence of preaspiration;
7. F1 (first formant) transition to the adjacent vowel;
8. Transition of other formants to the adjacent vowel;
9. F₀ (fundamental frequency) perturbations in the onset of a following vowel;
10. Intensity of the release burst;
11. Larynx height differences, i.e. larynx lowering with the voiced stop;
12. Expansion of the oro-pharynx with the voiced stop.

Features 1-10 can be regarded as relevant both for production and perception; the last two seem to be physiological mechanisms which may facilitate the maintenance of vocal folds vibration in voiced stops. The first ten can be further sub-divided into two groups on the grounds of being derived from the measurements made in the temporal or spectral domain.

The temporal domain features are mainly concerned with timing: both voicing and aspiration (features 1 & 2) have acoustic contents; however, it is their duration which is usually measured. The two features combined have been mostly studied under the Voice Onset Time (VOT) paradigm, introduced by Lisker and Abramson (1964) for initial stops. Preaspiration, although relevant for voicing opposition in such languages as Swedish and Irish (Ni Chasaide, 1985), has no reference to the implementation of voicing contrast in English or Polish. The two last features in this group, i.e. closure duration and preceding vowel duration difference are measured mainly in the context of word final or syllable final stops.

Following the VOT paradigm, it is possible to define three contrastive VOT categories corresponding to the phonetic categories 'fully voiced', 'voiceless unaspirated' and 'voiceless aspirated', which underlie the before mentioned grouping of languages. Lisker and Abramson (1964) define

fully voiced stops as those with voicing during closure, i.e. where voice onset 'leads' before the release; voiceless stops are those where voice onset 'lags' after the release: voiceless unaspirated stops are characterized by a 'short lag' (up to 20-25 ms), voiceless aspirated stops have a 'long lag' (more than 25 ms).

The spectral features are argued to be of lesser importance and to function as secondary ones as they are not independently controlled, being unavoidable production by-products of a voicing contrast (Ni Chasaide, 1985). For example, an aerodynamic explanation can be offered for differences in the intensity of the release burst between voiced and voiceless stops: as the vocal folds are abducted for the voiceless stop, pressure behind the oral constriction is higher, resulting in a higher intensity burst. Furthermore, Ni Chasaide (*ibid.*) argues that some of specifically spectral features might be considered secondary in terms of their relevance for the perception of the voicing contrast. Experimental studies indicate that the importance of such cues as F_0 perturbances or the intensity of the release burst may not constitute an important cue either for intervocalic stops (Lisker, 1957), or word-finally (Raphael, 1972) especially in the dialects of English where final stops may often be unreleased. The transition of F_1 has been limited as a cue to the languages which have an aspirated voiceless plosive series; its perceptual relevance is diminished by the fact that even in the languages which have aspiration, the F_1 cue is acquired relatively late and by association, whereas the temporal aspects of VOT seem to be acquired at a very early age (Ni Chasaide, 1985).

Temporal features 1-5 are in the focus of the present study: the VOT value, differences in the duration of a preceding vowel and differences in closure duration have been recognized as the basic phonetic cues for the implementation of the voice contrast. The VOT is measured for post-pausal, prevocalic stops, the VOT and closure duration are measured for word-medial and phrase-medial stops, while closure duration and preceding vowel duration is measured for word-final stop consonants.

The claim that the phonetic correlates of the phonological contrast can be used as markers in the speech production by Polish speakers of English stems from the comparison of the two phonological systems. Using the term proposed by Fledge (1987), the difference can be rendered by

means of a need to acquire a complex pattern of 'new' (voiceless aspirated) phones, and 'similar' (voiceless unaspirated for voiced) phones in order to implement the initial stop voicing opposition on the one hand, and the need to suppress the strengthening tendency of neutralization in the final stops on the other. A complicated task of implementing the opposition in a native-like manner in English is further complicated by the need to include the aspiration pattern and the phonetic as well as the phonological vowel duration in the system.

2.3.2. Aspiration: the case of the allophonic distribution of a voiceless coronal stop in English and Polish

The implementation of stop cognate opposition by means of the contrast between voiceless aspirated and voiceless unaspirated stops in prevocalic position in English requires the acquisition of the former, i.e. voiceless aspirated stop by the Polish speaker of English. Implementing the opposition by means of the vocal fold vibration difference, i.e. voiced and voiceless unaspirated, the native speakers of Polish need to adjust their phonological system for the English speech production in two respects:

1. They need to acquire a new phone, i.e. aspiration, and include it into the already existing opposition pattern, which leads to the need to acquire a 'similar' rather than a 'new' phone: aspirated voiceless stop.
2. They need to substitute the voiced stop for the voiceless unaspirated cognate in the word initial position.

The use of voiceless aspirated and voiceless unaspirated stop contrast in word initial position involves the contrast of long lag VOT values and short VOT values (Lisker and Abramson, 1964; Keating, 1983); languages of this type generally show difference between initial and medial position: the most common pattern involves medial deaspiration of initial voiceless aspirated stops and/or medial voicing of initial voiceless unaspirated stops, with the degree of stress implied as an important factor in this pattern. English is described as having voiced medial stops, but not specifically before unstressed vowels (Keating, Linker, Huffman, 1983).

In contrast, languages which implement stop cognate opposition by means of voiced – voiceless contrast, neither of which is aspirated, can be seen as characterized by voice lead, i.e. voicing before the release of

the closure, vs. short lag VOT values (Keating, Mikos, Ganong, 1981). Languages in this category do not show any real difference between initial and medial position; there is little variation across these positions and no tendency towards medial voicing, devoicing or aspiration. The variation between the initial/medial position and final position may stem from the restriction on final stop occurrence or the rule of word final stop devoicing. The latter is the case of Polish, where word-final stops are devoiced in the process of neutralization, suspending the voicing opposition between all obstruents.

The present study is limited to the voicing contrast in alveolar (apico-coronal) stops [t] and [d]. Consequently, the discussion of the general tendencies and processes is mainly concerned with these two representatives of stop consonants, and draws conclusion from the investigation of the behaviour of these two sounds. The discussion of the next parameter involved in the voicing opposition, i.e. aspiration, will concentrate on the production of a voiceless apical stop [t] in English in different contexts, comparing the VOT values. However, before the discussion based on experimental data, let us briefly describe the function and acoustic correlates of aspiration as well as the positional variants of a voiceless apical stop expected in Polish and English.

Aspiration, defined by Daniel Jones as a slight puff of breath following the release of a plosive (Jones, 1975), can be either allophonic, i.e. non-distinctive, or distinctive, i.e. it can be a carrier of an opposition, as in the case of prevocalic, prestressed stops in English. Aspiration is often assumed to be in some way related to 'tenseness', 'force of articulation', or a 'heightened subglottal pressure' (as in the SPE, Chomsky and Halle, 1968).

However, there is strong evidence pointing to the temporal aspect of aspiration: the onset of voicing after the release of the aspirated consonant stricture is delayed, resulting in a period of voicelessness (Lass, 1984). The delay in the onset of voicing can be measured, giving precise information as to the presence or absence or the degree of aspiration; the measurement technique, introduced by Abramson and Lisker (1964) for capturing the temporal aspects of consonant production, seems to be the most effective paradigm for studying this phenomenon. In the phonological system, aspi-

ration must be included as a distinctive feature for the system of English oppositions. In the phonological system of Polish, however, aspiration is not included at any level of analysis, i.e. neither phonetically nor phonologically does it function within this language. The phonological opposition between stop cognates in initial and medial position is expressed by the difference in vocal fold vibration, being an almost prototypical example of a simple voiced-voiceless obstruent contrast, without any doubts as to the phonological features involved and the phonetic correlates (Keating, 1980).

The distribution of aspiration as a feature included in the specification of a voiceless stop consonant in English, is briefly accounted for by J.C. Wells in his Pronunciation Dictionary (1990). Wells is concerned with aspirated consonants rather than with aspiration as such; he says that an aspirated consonant is accompanied by a brief [h] sound. He goes on to explain that: "In certain environments the English plosives, p, t, k, are aspirated. That is to say, there is a delay between the release of the primary closure of the articulators and the beginning of voicing for the sound that follows." (Wells, 1990:221).

There are three possibilities for the relationship between voiceless stops and aspiration: the [p], [t], [k], sounds may be aspirated, unaspirated, or either slightly aspirated or unaspirated. The first two cases exemplify a classical distributional allophonic difference, whereas the third one is a case of free variation. The descriptive terms 'aspirated', 'slightly aspirated' or 'unaspirated' refer to the perceptual correlates of articulatory differences, which reflect different strategies of phonetic implementation. Phonetic implementation strategies can be expressed by means of acoustic parameters reflecting temporal phenomena of timing relations obtaining between the beginning of closure and its release (closure duration) and the release of the closure and the onset of voicing for the following sound (VOT).

The cross-language VOT measurements set the boundary between voiceless unaspirated and voiceless aspirated at 20-25 ms; in the case of voiceless unaspirated stops voice onset lags after the release by up to 20-25 ms (short lag), whereas in the case of voiceless aspirated stops voice onset lags for more than 25 ms (long lag) (Lisker and Abramson, 1964). In phonological terms, the acoustic parameters reflect different aspects of

phonetic implementation strategies employed by native speakers of a language.

As expected for a category 1 language, which contrasts stop consonant cognates by vocal fold vibration, i.e. voiced and unaspirated voiceless, variability within a voiceless stop category is much smaller in Polish than in English. The unaspirated coronal stop [t] is the major allophone of the phoneme /t/; palatalized allophone occurs before the front high vowel /i/. The average VOT for a prevocalic, unpalatalized [t] in Polish measured by Keating in the study of voicing contrasts in Polish, ranges between 15 and 20 ms (Keating, 1980), asserting the unaspirated category for the voiceless apical stop in Polish.

The category difference in the phonetic implementation of voicing opposition in stop consonants in Polish and English requires that a Polish user of English as a second language acquire a new category: voiceless aspirated, as well as the rules concerning the degree of aspiration and the choice of one particular allophone of the phoneme /t/ for a given context. The acquisition of the allophones and the acquisition of the rules for their complementary distribution and free variation, present two different tasks, the first of which forms a prerequisite for the second.

The acquisition of a new category: voiceless aspirated, conditions a native-like implementation of the voicing opposition in English. The acquisition of allophonic differences and native-like context-dependent phonetic instantiations of the voiceless coronal stop is one of the crucial pronunciation variables for accent differentiation. Moreover, aspiration satisfies a requirement of being placed relatively high in the speakers' consciousness, which Trudgill (1981) sets for sounds which undergo shifts, i.e. function as speech markers. All these factors motivate the choice of aspiration and allophonic variation dependent on it as phonetic parameters in the sociolinguistic study of English as a second language spoken by Polish native speakers.

2.3.3. Phonological and phonetic vowel duration in Polish and English

The durational characteristics of the vocalic elements of the language system are language-specific. The phonological function performed by the

durational differences can be illustrated by the contrastive use of vowel length in English. The language-specific effect needs to be learned in the process of language acquisition; the language-universal effect, on the other hand, is claimed to be phonatory-based, i.e. physiological in nature. There is a cross-language tendency for low vowels to be longer than high vowels, all things being equal: this tendency illustrates the phenomenon of intrinsic timing in the production of vowel sounds (Lehiste, 1970). The regularity seems to point to the existence of some physical patterns and jaw movements which are preferred over others because of general principles of economy of effort and motor control (Keating, 1985).

However, besides intrinsic vowel duration, which is uncontrolled by the speakers, vowel duration can vary as a result of the phonetic context. The question of the degree of control over vowel duration by the speakers is in fact the question of certain observable processes falling into the domain of automatic, physiological implementation, or controllable domain of phonological rules of a language. The difference in vowel duration dependent on voicing of the following consonant is the case taken up by the present study (see also Waniek-Klimczak 2005 for the exploration of this issue).

A general tendency for vowels to be at least 10% shorter before voiceless obstruents than before voiced obstruent or sonorants has been claimed by Chen (1970) on the basis of a cross-language survey. Chen suggested that the durational difference between vowels dependent on the following context is a physiologically determined universal tendency, exaggerated by some languages, like English, by rule (see also Maddieson 1997). The exaggeration noticed in vowel durational differences in English motivates the claim that vowel duration is rule-governed in English, i.e. it is supplied by the phonological system of the language, whereas it is automatically implemented in the languages without exaggeration, remaining within the domain of phonetics (Fromkin, 1977).

The above mentioned distinction of languages according to the vowel durational characteristics places Polish and English in two different groups: the vowel system of English contains a phonological length contrast, whereas Polish is claimed to have a phonetically motivated, context-dependent vowel durational difference. In fact, the distance between the two languages may be even greater, as vowel duration in Polish has

been found not to vary systematically according to the voicing of the following consonant (Keating, 1980, Jassem and Richter, 1989)

The vowel system of Polish (Wierzbicka 1980) contains six vowels on the level of major phonetic types: a high front vowel /i/, a high non-front vowel /ɨ/, a mid-front vowel /e/, a low-mid vowel /a/, a mid-back vowel /o/, and a high back vowel /u/. All front vowels are unrounded, the back vowels are rounded. The two nasal vowels usually diphthongized phonetically, complete the picture of Polish vocal system: there is no phonemic vowel duration and/or lax – tense distinction.

Compared to the Polish one, the vowel system of English⁸ is extremely complicated: twelve steady-state vowels differ in the place of articulation as well as in tenseness/ laxness; six vowels are inherently longer, consequently further complicating the pattern of context dependent lengthening / shortening effect; moreover, the vocalic system contains eight diphthongs (three 'true' diphthongs and five vowel + glide combinations, recognized as diphthongs phonetically). The phonological vowel duration in English is interpreted as an inherent feature of individual phonetic major types corresponding to tenseness of the vowels. Apart from the durational differences inherent to the vowel system of English, i.e. long/short, tense/lax contrast, English makes use of the vowel duration as a major cue for voicing of the following obstruent (Wolf, 1978; Hogan and Rozsypal, 1980; Kluender et al., 1988).

The acquisition of the English vowel system and the rules governing their context dependent lengthening is one of the most demanding tasks for the learners of English as a second language. The acquisition seems to be particularly difficult in the case of the Polish learners (see Sobkowiak, 1996), as it requires a complete re-modelling of the spatio-temporal relations (Puppel, 1988). The new system demands a much more precise specification of the phonetic plan for articulatory gestures, which need to include contrastive timing. The exaggerated vowel duration differences

⁸ The dialect of English which is taken as the basic one for the present study is broad RP, being the variety generally accepted by the subjects of the experiment as the dialect which they aspire for or recognize as the 'high' variety associated with high status and consequently worth acquiring.

are controlled; the degree to which Polish speakers of English can rely on automatic vowel duration implementation remains to be investigated.

English vowel duration seems an obvious candidate for a marker in non-native English production; in the case of the production performed by the native speakers of Polish, the durational parameter deserves thorough investigation due to the distance between the exaggerated lengthening / shortening mechanism in English, and the lack of this universal tendency in Polish. Moreover, the awareness of the difficulty in the native-like vowel production in English has been shared by all the subjects of the reported experiment. Their choice of RP, with its marked tendency for overlengthening of already long vowels, as the model pronunciation, adds further motivation to the choice of this parameter as a variable for testing the socio-psychological hypothesis.

The study of acquisition of the inherently long and inherently short vowels of English logically precedes the investigation into the use of vowel duration as a cue for voicing of the following obstruent. Our aim is to establish the pattern of acquisition of the long/short vocalic segments as a prerequisite for the study of the contrastive function of vowel duration, i.e. the extrinsic duration. The context dependent lengthening / shortening of English vowels is discussed from the perspective of marking a voicing category of word final apical stops, which is neutralized in Polish.

Chapter Three

The Sociophonetic Study

The sociolinguistic assumptions outlined in Chapter Two have given the methodological background to the design of the phonetic experiment, set up in order to test the validity of formulated hypotheses. The experiment follows the Labovian attention-to-speech paradigm in broad terms, i.e. it includes procedures aiming at eliciting styles differing in the degree of formality: word list reading, passage reading, answering a questionnaire and general conversation.

The description and analysis of the experiment has been organized as follows: first, a design adopted for the reported phonetic experiment is described and motivated (3.1.), then the subjects and experimental procedure are described in sections 3.2. and 3.3. respectively. As the experiment comprises an investigation into the phonetic implementation of three parameters: voice implementation in the case of coronal stop consonants, aspiration in the case of a voiceless coronal stop, and phonological and phonetic vowel duration, the experimental procedure for individual parts of the experiment is presented in 3.3.1., 3.3.2. and 3.3.3. respectively. The results are presented in individual sections of 3.4. and summarized in 3.5.

The aim of this sociolinguistic, quantitative study of pronunciation variables has been to verify the validity of two tentative statements about the outcome of the research, i.e. two hypotheses formulated in Chapter Two. The hypotheses claim the existence of non-directional (weak hypothesis, 2.2.1.) and directional (2.2.2.) relationship respectively between the attitude of the speaker and the use of phonetic parameters in implementation

of voicing, aspiration and vowel duration. The non-directional relationship first checked by means of the null hypothesis which we shall try to reject in the course of the study; the null hypothesis predicts neither positive nor negative relationship between the variables. The directional hypothesis, on the other hand, predicts positive relationship between attitude in broad sense and language acquisition.

However, the function of the experiment reported here is twofold, i.e. the sociolinguistic variables chosen as the parameters in the study of second language use in two experimental groups are first employed in the investigation of the sociolinguistic hypotheses, and further investigated from the point of view of the phonological conditioning of the phonetic implementation of these parameters. Once the relationship between the two experimental groups has been established, the implementation of the phonetic categories will be investigated within and across the groups of subjects.

The data elicited in the course of the reported experiment have been used as a set of 'pilot study' results, enabling a general overview of the second language speech production performed by Polish speakers living in Britain; the same data have been later used in a more specific study of a limited number of phonetic parameters, chosen on the basis of previous, general overview. The consequences of such a procedure can be seen in the design; although they can be viewed as an obstacle to an increase in the number of tokens, they are believed to have an advantageous influence on the degree of reliability of the data, which bear little evidence of artificiality imminent in single-parameter oriented studies.

Most of the recordings used in the study have been made under natural conditions, i.e. in the subjects' homes or offices; only the recordings of the 'norm', control group of native speakers of English have taken place in a sound-attenuated booth. This factor can be seen either as a drawback or an advantage: the lack of specially prepared setting for the recordings resulted in a higher level of the background noise; however, at the expense of worsening of the quality of the acoustic signal, a greater degree of ease and confidence on the part of the speakers was obtained. The requirements on the experimental setting and design have been largely determined by

such factors as the age of some of the speakers and a general reluctance to participate in the experiment.

3.1. Experimental design

Let us begin the presentation of the experimental design of the present study by naming the elements of an ideal experimental design, which can be used as a reference system for further discussion. True experimental design has been claimed to have three basic characteristics: 1) the presence of a control group or groups, 2) the random selection and group assignment of subjects, and additionally 3) the administration of a pretest in order to capture the initial differences between the groups (Hatch and Farhady, 1982).

The three characteristics mentioned above are believed to form a safeguard system against the problems connected with internal and external validity, which should be maximized in an effort to reach meaningful results in the course of the experiment. The internal validity, i.e. the extent to which the outcome of the research is a function of the controlled factors, can be maximized by means of a careful selection of the subjects and experimental procedure. The external validity refers to the extent to which the results of the experimental study apply to the real world situation, and calls for a careful selection of a sample group of subjects, representative for a total population.

The effort to maximize both internal and external validity may lead to a paradox: in order to have the most reliable, internally valid results, we should restrict the experimental procedure as carefully as possible, controlling a maximal number of factors; however, the limitations may lead to creating an artificial laboratory world, not comparable to the outside, real world and consequently the ideal internal validity may exclude external validity in the social context. Maximizing external validity, on the other hand, may result in the introduction of too many uncontrolled factors into the design, thus questioning the internal validity of the outcome.

Clearly, the aim of the experimental design should be to maximize both the internal and external validity without the risk of losing the balance between the two. The selection of the procedures needs to be based on a thorough factor analysis and be well motivated by the aim of the study. The

importance of the external validity for the present experiment has acted as a decisive factor in limiting the laboratory conditions for data collection; however, the limitations on the choice of the samples of the populations claimed to be different may have resulted in lowering the external validity.

The design is based on the selection of variables to be investigated. A variable can be defined as “an attribute of a person or of an object, which varies from person to person or object to object” (Hatch and Farhady, 1982) or more specifically, a linguistic variable can be treated as a predetermined element which is known in advance to have different realisations: each variable has a list of variants, i.e. alternative forms (Hudson, 1980). The first definition underlies the concept of dependent, independent, control or intervening variables specified in the experimental design, whereas the second one refers to the sociolinguistic and dialectologist studies, where linguistic variables function as dependent variables in the quantitative study.

In the experiment reported here, the independent variable, i.e. the major variable which is selected and manipulated in the course of the study, is the investigated group attitude towards the target language speech community: the two populations which are claimed to be different, are chosen on the basis of the socio-psycholinguistic assumptions. The dependent variables, i.e. the variables measured in order to determine the effect of the independent variable, are the measurements of the following phonetic parameters of voicing: Voice Onset Time for word initial apical stops; closure duration, voicing into closure and Voice Onset Time for word-medial and phrase-medial apical stops; phonetic context dependent realisation of a voiceless apical stop: VOT, closure duration and voicing into closure duration in word- final, phrase- medial stops; context dependent vowel duration of inherently long vs. inherently short vowels of English.

The number of variables involved in the study results in a multi-level factorial design adopted for the experiment. The phonological variables of voicing, inherent vowel duration and word boundary are introduced as moderator independent variables: the function of moderator variables is to investigate whether they modify the relationship between the dependent and the major independent variables. For example, the moderator variable of phonological vowel duration is introduced in order to investigate

whether the use of the parameter of phonetic vowel lengthening or shortening before voiced/voiceless apical stops by each of the groups depends on the inherent, phonological vowel duration.

The moderator variable of phonological, underlying voicing is introduced in the investigation of particular phonetic parameters of voicing: VOT and closure duration in word-medial stops; closure duration, voicing into closure and vowel duration in word-final, phrase-final stops. The phonological context functions as a moderator variable in the experiment investigating word-initial and word-final aspiration of a voiceless apical stop, as well as in the experiment concerning voice implementation in word-medial vs. phrase-medial, word-final stops.

The complexity of the design stems from the effort to capture certain generalizations in the use of different phonetic parameters by the two groups of speakers. The particular phonological and phonetic relationships are investigated and discussed separately (see Waniek-Klimczak 1993, 2005), but they all refer to the same, general issue; consequently, the main hypotheses formulated in Chapter Two, are tested by means of a series of specific phonological sub-hypotheses investigated by means of the phonetic data. The study hopes to reveal a complex pattern of inter-relationships between the two sources of variability: phonological and social-psychological.

In an effort to maximize external validity of the study, the control group has been added to the two investigated groups of speakers. The control group consists of five native speakers of English; the value of the dependent variables in this group is assumed to be a target value for each phonetic parameter investigated in the course of the experiment.

3.2. Subjects

Twenty Polish-born speakers of English as a second language and five native speakers of English served as subjects in the experiment. The native speakers of Polish belong to the Polish speech community in London, where they had been living for at least five years prior to the experiment, which was conducted over several months in 1986/1987.

The group of native speakers of English, Group 3, consists of five members: one male and four females. Their age ranges from 23 to 35;

their accent in English has been judged as an educated southern variety of English, corresponding to broad RP or BBC English as described by A.C. Gimson (1986) and J.C. Wells (1982). Although they come from different backgrounds, their education guarantees the standard accent. The choice of the standard accent of English as a norm representing the target for the English performance accepted by the other two groups is justified by the recognition of this particular accent of English as the target accent by all the speakers.

The group comprising the ‘old’ immigration, Group 1 in the design, includes 10 subjects, three male and seven female speakers. The age range is from 60 to 75; all subjects spent most of their stay in England in London. They were all members of the Polish Armed Forces fighting within the allied powers; most of them fought under General Anders in the corps which became the Second Polish Corps of the British Eighth Army. The majority of subjects, eight speakers, came to Britain after the end of World War II, in 1946. Two subjects, a couple, settled in Britain earlier, in 1941.

The life stories of the subjects include the facts and type of experience believed to be fairly common within the post-war Polish immigration community in Britain: a middle-class background in pre-war Poland, considerable prosperity enjoyed in Warsaw or Eastern regions of Poland, the overturn of the fortune with the beginning of the war, in some cases also the horror of Russian persecution followed by the enrollment into the Anders Army and the war experience from the Middle East, Italy, Germany and other places in Europe. Finally, arrival in Britain with the belief that the settlement there would be only temporary, till true liberation of Poland, which would enable them to go back to Poland one day.

The beginning of their new life in a new country was far from easy: most of them had had no English before coming to Britain, in spite of the fact that they had heard English spoken at times during the war years. However, even in the British forces, they needed to know the languages of the countries where they stayed and fought more than English. Their pre-war education equipped most of them with a good command of French, some learned German or Italian, and most could speak good Russian after the years spent in that country; English seemed extremely difficult, and for a long time – not necessary.

Consequently, language difficulties heavily influenced the first impressions of Britain and of the British people, and limited the job possibilities. However, most subjects tried to combine the first, simple jobs with language learning. Some attended English evening classes, some tried self-teaching with the help of the radio and books. They all stress the importance of self-study and formal instruction, in contrast to the 'natural' acquisition, which was perceived as a bad influence of the uneducated variety of the English language. This attitude is justified by the type of the natural input which they were exposed to during the early years in Britain, when they worked mostly as unqualified workers and lived in poor areas.

The tendency for self-advancement soon bore fruit, and the socio-economic status of all the subjects gradually improved. In the period of the recording, they had already retired from their professional activities, but were still active in the Sikorski Institute and other Polish organizations in London. The previous professional life of all the subjects required a working command of English, i.e. they worked for the English employers, and generally speaking, they used English in the domain of their professional careers.

Group 2, i.e. the 'newer immigration' group, includes ten subjects: two male and eight female subjects. They came to Britain in 1980/1981, mostly with the purpose of a short stay - up to a year, during which they hoped to earn some money and learn English. They had no work permits, so they took any type of illegal job which they could find: cleaning, washing-up in small restaurants, taking care of elderly people or children (often in Polish 'old' immigration homes). The imposition of martial law in Poland on December 13, 1981, changed their status overnight: from a fairly typical, poor country student visitors, they became eligible to claim the refugee status on political grounds.

As in the case of Group 1, the within-group life-story and the new development forced by new circumstances follow certain patterns, shared by all the members of the group. There is a considerable similarity in the choice of a career, the career development, and the opinions concerning the future in the new country. The basic life-story pattern begins with keeping the same job for some time even after having been granted the work permit. Time is needed in order to get ready for a major change in the type of em-

ployment; young people, former students of Polish universities, enroll in the university courses of various sorts, even Polish studies, in the hope of gaining a higher status in the target speech community. In the meantime, they study English: some find it very difficult to combine their jobs with the classes, but they prove highly determined to reach the goal.

The choice of the subjects for the experiment was not truly random, as they represent two networks and in this sense can be viewed as convenience groups. However, the representatives of the two Polish groups were chosen on the basis of group homogeneity with respect to social and linguistic background. The task of finding subjects willing to agree to the recording of their spoken production in English proved more difficult than expected. Although very friendly and ready to talk with the researcher, they were generally very reluctant to let their English be recorded. The reasons for the reluctance may be sought in the low level of confidence in English on the one hand, and the limitation set by the nationality of the researcher, who is Polish.

The consequences of the researcher being Polish are complex, and difficult to estimate. The fact that the native language of the subjects and the researcher is Polish rendered the initial conversation in English highly unnatural; consequently, the task requiring speaking English may have been perceived as more artificial. However, the ethnic affinity proved beneficial in persuading the subjects into taking part in the experiment at all: they agreed to do it mainly in order to help the researcher, who appealed for their assistance in trying to find out how to maximize the effort of people who study English ‘back home’, in Poland.

Generally speaking, although the Group 1 subjects were generally more reluctant than Group 2 speakers to agree to participate in the experiment at all, they were surprisingly comfortable with the tasks during the actual recording session, often extending the conversation in English long beyond the asked minimum. The second group of subjects, on the other hand, although more eager to agree to the recording, proved rather uncomfortable with the use of English during the conversation following the basic recording. It is hoped that the natural setting for the recordings, i.e. subjects’ homes or friendly offices in Sikorski Institute (for some subjects from Group 1), improved the naturalness of the recorded speech production.

3.3. Experimental procedure

Except for two recordings of the Control Group subjects, which were made in a sound-treated booth in the Oxford University Phonetics Lab, all other recording sessions took place in the subjects' homes or offices (at the Sikorski Institute in London and a London University classroom). The recordings were made using a high-quality cassette-recorder and a microphone for speech recording borrowed from the before mentioned Phonetics Laboratory⁹, and the data were collected on TDK AD/ SF 60 cassettes.

Subjects were asked to read a list of words, a passage about the weather from a humorous book and to answer a questionnaire. No time for preparation or practicing the formal performance was given, which may have resulted in an increase of perceived difficulty of the task; however, as the same condition was kept across all subjects, the influence of such additional factors as the lack of reading skills or problems with understanding do not seem to limit the validity of the results¹⁰. An effort to elicit the least formal style in the conversation following the questionnaire answers led to a success in some cases, but not in all cases. Consequently, the data from the informal part of the experiment could not be included in the analysis, allowing only for very tentative, impressionistic judgments.

The analysis of the data aiming at testing the two sociolinguistic hypotheses was undertaken by means of the investigation of three major experimental issues, described under Experiment 1, Experiment 2, and Experiment 3. The analysis was conducted in two stages: the first one involved a traditional spectrographic analysis with the use of a Voice Identification system, in the Phonetics Laboratory in Oxford; the second one was based on a computer analysis with the use of a Computerized Speech Lab package by Kay Elemetrics, performed in the Phonetics Laboratory of

⁹ My gratitude to the staff members of the Phonetics Lab in Oxford University needs to be expressed here. I gratefully acknowledge their invaluable help - without their generosity in making the equipment available whenever needed, the recordings would have never been completed.

¹⁰ As the result of misunderstanding or the lack of familiarity with a given word or phrase from the passage or the word list, some tokens had to be judged missing when the speakers changed pronunciation of these words beyond recognition limit.

Trinity College, Dublin¹¹ and the Linguistic Department of University of Nottingham¹².

The data for the experiments are all numerical values, as all types of measurements involve duration of particular phonetic parameters, measured in milliseconds. The measurements taken from the computer screen were repeated at least twice; after the completion of all measurement taking, a random check on the results was conducted, by repeating the measuring procedure for the randomly chosen items.

3.3.1. Experiment 1: Stop consonant voicing

Phonetic implementation of a phonological contrast between the coronal stop cognates is the subject matter under investigation in experiment 1. The independent variables in the design are the sociolinguistic factors obtaining in two groups of subjects; the dependent variables are represented by the phonetic parameters used as cues for voicing in different phonetic contexts.

Voicing contrast has been investigated in the following positions: phrase and word initial (1.1.); word-medial (1.2.); word- final phrase-medial (1.3.); word-initial, phrase-medial (1.4.), and phrase-final (1.5.).

The VOT for the following phrase and word initial apical stop cognates was measured for each speaker:

1.1.1. tell, time, tower,

1.1.2. dare, doubt, do,

Closure duration, voicing into closure and VOT were measured in the following words for each speaker for word and phrase medial contexts:

1.2.1. city, witty;

1.2.2. cloudy, anybody;

1.3.1. a bit of;

¹¹ The help and assistance of the staff members of the Phonetic Lab in Trinity College, Dublin, led by Ailbhe Ni Chasaide, is gratefully acknowledged here.

¹² The research in Nottingham was sponsored by The British Council; my gratitude goes to the British Council Office in Warsaw and Dr. Christopher Butler who kindly invited me for a research period, offering help with the statistical procedure as well as hospitality in the department; I am also grateful to Dr. Andrew Crompton and Ms. Bozena Cinkole for their help, advice and discussion.

1.3.2. good at;

1.4.1. the type;

1.4.2. a dark;

Closure duration and vowel duration were measured in the following words for each speaker:

1.5.1. root, port, cat, pet, pot, heart;

1.5.2. who'd, hoard, had, head, hod, hard;

The underlying phonological feature [voice] is treated as the moderator variable in the design. Different types of contexts are investigated by means of the statistical analysis checking the validity of the hypotheses claiming the more-than-chance probability of the relation between the factors.

The data for each part of the investigation have been first described by means of the mean values, standard deviation, standard error, variance, skewness and kurtosis for each speaker and for each group. The non-directional hypothesis claiming the difference between the two groups of speakers, representing two populations (Group 1 and Group 2), has been tested by means of the t-tests for independent samples: the difference in the mean VOT value for phonologically voiced and voiceless coronal stop for each group is tested independently. The two-tailed t-test for non-directional relationship is followed by a one-tailed test for the second hypothesis, claiming the directional relationship, i.e. the more native-like values for Group 2.

Having tested the mean values in each group and between the groups with the aim of rejecting the null hypothesis and finding the statistical significance of the results verifying the formulated hypotheses, we proceeded with the investigation of the relationship obtaining between the sociolinguistic and phonological factors. With this objective in mind, the relationship obtaining between the following factors: group membership (independent variable) and parameter values for phonologically voiced and voiceless coronal stops (dependent variables) are tested by means of the split-plot ANOVA.

The factorial design includes two levels of the independent variable: speech community membership in Group 1 or 2, the dependent variable of phonological voicing measured by means of the parameter value. However, as the two levels of the dependent variable represent repeated measure-

ments (taken from the same set of speakers), the split-plot ANOVA design is used instead of the two-way factorial design¹³.

The split-plot design makes it possible to conduct the analysis of repeated measurements (i.e. the groups of measurements taken from the same speakers) for the two experimental groups. Thus, the ANOVAs are constructed in the following way: they include two variables, one repeated, with two levels for each variable; the independent variable A (group membership) has two levels corresponding to the two groups of speakers; the dependent variable B is a repeated measurement of a particular phonetic parameter under two types of phonological conditioning (e.g. VOT for phonologically voiced or voiceless stops, vowel duration before a phonologically voiced or voiceless stop, etc.).

3.3.2. Experiment 2: Aspiration

The pattern of context-dependent distribution of the Voice Onset Time as a basic phonetic cue for a voiceless apical stop is investigated in Experiment 2. The experimental question concerns the strategies employed in the phonetic implementation of a voiceless cognate – a similar phone, requiring the re-organisation of the voiced – voiceless contrast in the phonological system. The most universal parameter for distinguishing between different categories of stops, the VOT is measured for a phonologically voiceless stop in different contexts. The following word and syllable positions are investigated, with the preceding and following context of a vowel kept constant in all cases: word and syllable initial (2.1.), word-medial, syllable-initial (2.2.), word-final, phrase-medial (2.3.).

2.1. tell, time, tower;

2.2. city, witty, better;

2.3. a bit of, not important, what anticyclones;

The hypothesis tested in Experiment 2 claims the context-dependent use of the VOT parameter in a voiceless coronal stop by the two investigated groups: the use of the VOT is hypothesized to be significantly differ-

¹³ I am very grateful to Dr. Christopher Butler for drawing my attention to the need of applying the split-plot design rather than a two-way factorial design to my data.

ent for different contexts and different groups of speakers. The hypothesis claims a significant difference in the use of the VOT cue depending on the position of the voiceless coronal stop in a word: the relationship between the independent sociolinguistic variable and the moderator variable of the presence or absence of a word boundary between the voiceless coronal stop and the following vowel is hypothesized to reach the level of statistical significance.

The use of VOT in post-pausal, word-initial position in the data listed under 2.1. is compared to word-medial position (2.2.) in an attempt to test stress-related use of aspiration; in the second step, the VOT values for the absolute initial position (2.1.), word medial (2.2.) and word-final, phrase medial (2.3.) position are compared. All words containing /t/ in the final position in the experiment are one-syllable words; in the case of word-initial position, all occurrences of /t/ are in the syllable-initial position of the syllable receiving primary stress in the word. Consequently, the experiment contrasts the positions requiring different positional variants of the voiceless coronal stop in English.

The phonological system of English requires the use of different positional variants in the two contexts. The null hypothesis assumes that there is no statistically significant difference between the VOT values in the two contexts and that there is no difference in the use of the VOT as a context cue in the performance of the two groups under investigation. The relationship between the two independent variables accounts for the degree of acquisition of the category voiceless aspirated on the one hand, and the native-like command of the allophonic variation applying the use of the categories voiceless aspirated vs. voiceless unaspirated on the other.

In the second part of Experiment 2, the effect of a word boundary is checked in order to investigate the acquisition of a new category “voiceless aspirated” and its context-dependent use. The investigation in Experiment 2 continues the line of experimental parameter testing begun in Experiment 1 (especially Ex.1.3. and 1.4), naturally extending the discussion of voice implementation into the domain of traditionally allophonic phenomena.

The analysis of both parts of experiment 2 involves statistical tests of significance and analysis of variance described in Experiment 1, i.e. the

data are first listed, described, checked for normal distribution and then tested for significance difference between the samples by means of the parametric tests of significance: two-sample t-tests and split-plot ANOVAs.

3.3.3. Experiment 3: Phonological and phonetic vowel duration

The relationship obtaining between the acquisition of phonological vowel duration inherent in the vowel system of English and the use of vowel duration differences dependent on the following context for the vowel is investigated in Experiment 3. The issue of vowel duration differences has already been taken up in Experiment 1.5. where the use of vowel duration cue for the phonetic implementation of the voice contrast has been investigated. However, the use of vowel duration in the production of the English long vs. short vowels¹⁴ requires further examination in order to provide information for testing the hypothesis concerning the relationship between the use of phonological and phonetic vowel duration in the speech of the two groups of subjects.

Experiment 3 consists of two closely related sections: phonological vowel duration is in the focus of attention in Ex.3.1, while phonetic, i.e. context-dependent vowel duration is the subject matter of Ex.3.2. Experiment 3.1. begins with the investigation of inherent vowel duration acquisition and use in nine vowel series in the /h/.../d/ context; these basic data are then supplemented by six pairs of words containing the same vowels in the context of phonologically voiced or voiceless stops.

The study of vowel system implementation needs to begin with the research into the nature of this system; consequently, our first research question concerns the representation of phonological vowel duration in cognitive vowel system of the subjects. In order to answer this question, vowel durations within long and short vowels grouped together, within long vs. short vowel series separately, and in the context of phonologically voiced vs. voiceless stop consonants are compared by means of frequency distri-

¹⁴ Phonological vowel duration is understood as an inherent vowel duration characteristics; the differences of interpretation in the case of phonologically long vowels, i.e. the difference between [i:] and [ij], or [u:] and [uw] are not discussed as they are not relevant to the discussion of phonetic implementation of phonological duration as a characteristic feature of the British English vowel system.

bution displays (histograms), and checked for statistical significance by means of t-tests for correlated samples for each group. The relationship between the group and the use of vowel duration in the production of long vs. short vowels of English is investigated by means of a series of two-sample t-tests and split-plot ANOVAs.

The null hypotheses which we are trying to reject with reference to the individual factors are as follows: 1) there is no difference in vowel duration between the series of inherently long and inherently short vowels; 2) there is no difference between the two groups in the use of the vowel duration in the production of the inherently short vs. long vowels of English.

The use of numerous t-tests for testing hypothesis 1 within the groups gives grounds to the conclusions concerning each group individually; it is only after we have computed ANOVA, however, that we may formulate more general claims as to the interaction between the factors. T-tests and ANOVAs are further used in the analysis of phonological vowel duration contrast in four pairs of vowels: [i:]-[i], [a:]-[e], [o:]-[o], [u:]-[u].

The acquisition of the inherent vowel duration can be compared to the use of vowel duration as a cue for voicing of the following consonant. The hypothesis under investigation assumes that the acquisition of the inherent vowel duration acts as a prerequisite for the use of the vowel duration cue; in other words, the acquisition of the phonological system precedes the acquisition of the phonetic implementation rules.

The following words containing long and short vowels are used:

- 3.1. heed, hid, head, had, hard, hod, hoard, hood, who'd;
- 3.2. head, had, hard, hod, hoard, who'd;
- 3.3. pet, cat, heart, pot, port, root;
- 3.4. heed, hard, hoard, who'd.
- 3.5. hid, head, hod, hood.
- 3.6. heart, port, root;
- 3.7. pet, cat, pot;
- 3.8. hard, hoard, who'd;
- 3.9. head, hod, hod.

The data in 3.1. and 3.2. are treated as separate sets in the first step of the experiment: having described the data by means of descriptive statistics, we proceed with the frequency of distribution as the basis for claiming

the presence of two categories within the vowel system of the members of each group. The parametric tests for the significance of vowel duration difference within each group are computed on the data from 3.3. and 3.4.; 3.5. and 3.6.; 3.7. and 3.8.

The t-test testing the significance of durational difference within each group is followed by a t-test of mean differences in duration for the two groups, verifying the claim of the two groups representing different populations with respect to the inherent vowel duration parameter. The split-plot ANOVA is computed to check the interaction between the factors.

In the second stage of this experiment, the data from 3.5, 3.6., 3.7., 3.8. are investigated as respective groups of phonologically long vs. short vowels preceding phonologically voiced or voiceless coronal stop consonants; the relationship between the two phonological factors (phonological vowel duration and voicing of the following consonant) is checked by means of two-way ANOVAs within each group. The split-plot ANOVAs are used in order to check the significance of the difference in duration between the groups: the tests of raw data for each phonological factor are followed by the test of the two factors combined by means of converting the data into the ratio of expected longer duration to the expected shorter duration (i.e. vowel duration in the following context of a phonologically voiced stop is divided by vowel duration in the following context of a voiceless stop).

3.4. Results

The presentation of the results follows the pattern presented below and adopted in the course of experimental analysis:

- 1) the research questions and hypotheses tested in the course of each part of the experiment are specified for a given section,
- 2) the results yielded by the analysis of the data by means of the statistical tests of significance are given and briefly discussed as the basis for rejecting the null hypothesis in each section. The organisation of the presentation reflects the experimental procedure: each of the three major experiments is reported by means of a number of minor experiments testing the main research question. As the design includes several sections, each experiment (labelled Ex.1, Ex.2, and Ex.3) consists of

sub-experiments, referred to as sub-sections of a given major experiment (e.g. Ex.1.1, Ex.1.2., etc).

3.4.1. Experiment 1

Phonetic implementation of phonological category of voicing in English spoken as the second language by native speaker of Polish has been investigated in Experiment 1. The case study is concerned with the phonetic implementation of voicing in coronal stop cognates. The sociolinguistic hypotheses formulated in 2.2.1. and 2.2.2. claim the existence of a significant difference in the implementation of voicing contrast in English between the two experimental groups and the more native-like implementation of the contrast in Group 2, i.e. the group with shorter exposure to English, but more integrative motivation and smaller distance from the target language speech community.

As the native-like implementation of the voicing contrast involves the acquisition of a new phonetic category {voiceless aspirated}, the sociolinguistic hypotheses are checked by means of the phonetic experiment involving the study of the phonological system of the speakers and the phonetic implementation of this system. The design of the experimental study of phonetic implementation of the voicing contrast in coronal stops reflects functional distribution of stop consonants. The following positional variants have been considered: absolute initial, i.e. word and phrase initial; word initial in running speech; word medial, syllable initial; absolute final, i.e. word and phrase final; word final in running speech. Unless a pause is in the context, the coronal stops discussed here are always preceded and/or followed by vowels.

The implementation of phonological category [voice] is investigated by means of the temporal relationships expressed by the VOT (parameter 'a') for word and phrase initial stops. The VOT (parameter 'a') and closure duration (parameter 'b') have been measured for word and phrase medial stops; closure duration (parameter 'b') and the preceding vowel duration (parameter 'd') have been measured for word and phrase final stops. The summarised results for each context (experiments 1.1-1.5.) and parameter are presented with the number of observations, the mean value, standard

deviation, the maximum and minimum duration for each group in Tables 1-3.

Context	Parameter	N	Mean	St. Dev.	Max.	Min.
't/dV'	VOT [t]	30	63.13	28.77	141.00	25.00
Ex. 1.1.	VOT [d]	30	20.07	8.11	37.00	8.00
'Vt/dV'	VOT [t]	20	42.70	23.70	126.00	7.00
Ex. 1.2.	VOT [d]	20	15.50	5.93	27.00	7.00
	cl.d. [t]	20	98.70	24.26	143.00	46.00
	cl.d. [d]	20	63.60	18.37	95.00	30.00
'Vt/d.V'	VOT [t]	10	38.40	25.37	99.00	13.00
	VOT [d]	10	62.20	59.95	184.00	12.00
Ex. 1.3	cl. d. [t]	10	70.90	33.36	106.00	0.00
	cl. d. [d]	10	98.50	32.71	151.00	45.00
	VOT [t]	10	43.00	19.53	90.00	16.00
'V.t/dV'	VOT [d]	10	16.20	6.51	26.00	8.00
Ex. 1.4	cl. d. [t]	10	123.50	34.84	175.00	79.00
	cl. d. [d]	10	98.80	31.07	137.00	52.00
'Vt/d.V'	cl. d. [t]	60	155.25	43.11	205.00	67.00
Ex. 1.5.	cl. d [d]	60	118.13	38.77	495.00	36.00
	v. d. [t]	60	203.07	66.04	405.00	67.00
	v. d. [d]	60	270.70	76.92	450.00	52.00

Table 1: Summarised results for Group 1 in Experiment 1.

Context	Parameter	N	Mean	St. Dev.	Max.	Min.
't/dV'	VOT [t]	30	71.13	26.33	136.00	94.00
Ex. 1.1.	VOT [d]	30	17.03	6.52	37.00	8.00
'Vt/dV'	VOT [t]	20	52.70	25.64	115.00	10.00
Ex. 1.2.	VOT [d]	20	14.65	3.07	20.00	9.00
	cl.d. [t]	20	70.20	26.10	122.00	28.00
	cl.d. [d]	20	48.85	16.96	81.00	21.00
'V/d.V'	VOT [t]	10	28.00	14.45	51.00	9.00
	VOT [d]	10	34.80	26.07	88.00	10.00
Ex. 1.3	cl. d. [t]	10	41.00	17.16	69.00	22.00
	cl. d. [d]	10	65.90	43.62	159.00	26.00
'V.t/dV'	VOT [t]	10	57.40	25.27	95.00	18.00
	VOT [d]	10	16.70	4.88	25.00	9.00
Ex. 1.4	cl. d. [t]	10	87.30	26.86	136.00	57.00
	cl. d. [d]	10	97.40	19.27	132.00	67.00
'Vt/d.'	cl. d. [t]	60	141.30	47.06	252.00	22.00
Ex. 1.5.	cl. d [d]	60	108.80	39.68	210.00	36.00
	v. d. [t]	60	187.85	68.29	252.00	94.00
	v. d. [d]	60	256.88	92.04	495.00	95.00

Table 2. Summarised results for Group 2 in Experiment 1.

Context	Parameter	N	Mean	St. Dev.	Max.	Min.
't/dV'	VOT [t]	15	97.21	15.27	127.00	70.00
	Ex. 1.1. VOT [d]	15	19.20	6.39	34.00	9.00
'Vt/dV'	VOT [t]	10	75.10	30.40	129.00	38.00
	Ex. 1.2. VOT [d]	10	18.80	11.55	44.00	5.00
	cl.d. [t]	10	78.50	29.36	129.00	46.00
	cl.d. [d]	10	37.30	12.68	62.00	21.00
'V/d.V'	VOT [t]	5	50.80	20.63	77.00	23.00
	VOT [d]	5	25.20	17.17	53.00	10.00
	Ex. 1.3 cl. d. [t]	5	0.00	0.00	00.00	0.00
	cl. d. [d]	5	31.40	5.13	37.00	25.00
'V.t/dV'	VOT [t]	5	69.20	16.54	86.00	51.00
	VOT [d]	5	15.80	2.59	20.00	13.00
	Ex. 1.4 cl. d. [t]	5	53.40	16.83	65.00	25.00
	cl. d. [d]	5	72.00	19.27	102.00	53.00
'Vt/d.'	cl. d. [t]	30	117.37	39.27	170.00	102.00
	Ex. 1.5. cl. d [d]	30	65.67	24.56	122.00	20.00
	v. d. [t]	30	169.27	56.14	275.00	64.00
	v. d. [d]	30	264.30	85.41	405.00	202.00

Table 3: Summarised results for Group 3 in Experiment 1.

Ex.1.1. 't/dV'

In order to investigate the nature of implementation of a phonological contrast, the existence of this contrast in the linguistic system of the subjects needs to be established. The results (see Tables 1, 2, and 3) show that although the category distinction tends to be maintained, the acquisition of a native-like distribution varies. Clearly, the acquisition of language-specific voice category implementation strategies is not complete in either of the experimental groups. The tendency to implement the contrast by means of the use of phonetic category {voiceless aspirated} can be seen in an attempt to increase the duration of the VOT; the effect, however, does not point to a well-established pattern. The awareness of the existence of a new category exists – it can be seen in a tendency to overlengthen some of the VOT durations, while failing to use the same strategy other cases.

The comparison of the phonological system of the two experimental groups begins with a closer examination of the distribution of the data. Although neither group seems to follow the pattern of the control group, there is an interesting tendency hypercorrection and the ‘overshooting’ of the target values can be seen. Moreover, the distribution of the VOT values exhibits the highest degree of variability in the case of Group 2. The tendency for hypercorrection notwithstanding, the difference between the two experimental groups seems to be rather small; in order to test the sociolinguistic hypotheses, the parametric tests of significance have been applied: the relationship between individual mean values for each group for category voiced vs. voiceless has been tested by means of two sample t-tests; the relationship between the use of the VOT by the two groups of Polish speakers of English, and its conditioning by the phonological category [voice] has been tested by means of two-way split-plot ANOVA.

The results of analysis of variance (A 1.1.) confirm the use of the VOT parameter for phonetic implementation of voicing by both experimental groups; however, the use of the parameter is not significantly different for the two groups, making it impossible for us to reject the null hypothesis stating that the two samples are drawn from the same population.

The results of the main test of significance show that the two Polish groups do not differ systematically with respect to the use of the VOT in initial position. In order to find out more about the nature of the relationship between the VOT use in phonetic implementation of phonologically voiced vs. voiceless stops we need to run further tests, narrowing the scope of the data to the specific phonological category within each group of subjects. In an effort to meet this aim, mean VOT durations for each group have been tested within each phonological category, i.e. the VOT values for phonologically voiced and phonologically voiceless stops have been analysed separately and tested for significance between the experimental groups and the control group. Several t-tests for independent samples have been applied in order to specify the individual relationships (see Table 4 for the results).

Ex	Group	Parameter	Count	Mean	t	p
1.1.1.	1	VOT	30	63		
tV1a/tV2a	2	VOT	30	71	-1.12	0.26
1.1.2.	1	VOT	30	63		
tV1a/tV3a	3	VOT	15	91	-4.28	0.0001**
1.1.3.	2	VOT	30	71		
tV2a/tV3a	3	VOT	15	91	-3.24	0.0025**
1.1.4.	1	VOT	30	20		
dV1a/dV2a	2	VOT	30	17	1.59	0.11
1.1.5.	1	VOT	30	20		
dV1a/dV3a	3	VOT	15	19	0.39	0.69
1.1.6.	2	VOT	30	17		
dV2a/dV3a	3	VOT	15	19	-1.06	0.29

Table 4. The t-test results for group means in Ex. 1.1.

The t-test results point to the following:

- 1) the VOT values for phonologically voiced stops are not statistically significantly different for any of the three groups, regardless of the relationship tested (Group 1 vs. Group 2, Group 1 vs. Group 3 or Group 2 vs. Group 3);
- 2) for both Polish groups, the VOT values for phonologically voiceless stops are highly significantly different from the English group; the difference between two experimental groups fails to reach significance, largely due to a high degree of variability in group 2.

The results of the t-tests confirm less formal conclusions drawn from the comparison of the frequency of distribution data: although the use of the VOT parameter is significantly different for each of the Polish groups when compared to the English group, the difference between Polish groups fails to reach significance. Both Group 1 and Group 2 manage to implement phonological category [voice] by means of positive VOT values (see highly significant result for variable ‘voicing’ in ANOVA 1.1.); although the difference between the two groups can be observed, however, it does not reach statistical significance (see variable ‘group’ and ‘interaction’ in ANOVA, Table 5).

Experiment	Parameter	Group	Source	F	p
A 1.1.1.	VOT	1/2	Group	0.44	0.51
			Voicing	181.51	0.000**
			Interaction	2.34	0.127

Table 5: Summarised results of split-plot ANOVA for the VOT values in [t] and [d] entries in Group 1 and 2.

Ex.1.2. 'Vt/dV'

Part two of Experiment 1 investigates the use of two parameters in phonetic implementation of [voice] contrast: VOT (a) and closure duration (b). Phonetic implementation of a voice contrast is discussed from the point of view of the linguistic systems of the speakers: the existence of two distinct categories implemented by each parameter individually, and both parameters correlated are investigated.

Experiment	Group	Parameter	Count	Mean	t	p
[t]						
1.2.1.	1	cl dur	20	98.7		
VtV1b/VtV2b	2	cl dur	20	70.2	3.58	0.0011**
1.2.2.	1	cl dur	20	98.7		
VtV1b/VtV3b	3	cl dur	10	78.5	1.88	0.07(*)
1.2.3.	2	cl dur	20	70.2		
VtV2b/VtV3b	3	cl dur	10	78.5	-0.76	0.465
1.2.4.	1	VOT	20	42.7		
VtV1a/VtV2a	2	VOT	20	52.7	-1.28	0.21
1.2.5.	1	VOT	20	42.7		
VtV1a/VtV3a	3	VOT	10	75.1	-2.95	0.0097**
1.2.6.	2	VOT	20	52.7		
VtV2a/VtV3a	3	VOT	10	75.1	-2.00	0.060(*)
[d]						
1.2.7.	1	VOT	20	15.5		
VdV1a/VdV2a	2	VOT	20	4.65	0.57	0.58
1.2.8.	1	VOT	20	15.5		
VdV1a/VdV3a	3	VOT	10	18.8	-0.85	0.42
1.2.9.	2	VOT	20	14.65		
VdV2a/VdV3a	3	VOT	10	18.8	-1.12	0.29
1.2.10.	1	cl dur	20	63.6		
VdV1b/VdV2b	2	cl dur	20	48.85	2.64	0.012**
1.2.11.	1	cl dur	20	63.6		
VdV1b/VdV3b	3	cl dur	10	37.3	4.58	0.000**
1.2.12.	2	cl dur	20	48.85		
VdV2b/VdV3b	3	cl dur	10	37.3	2.09	0.045*

Table 6: The results of mean comparisons between Groups 1,2,3 for [t] and [d] entries in Ex.1.2.

The Frequency distribution patterns of two parameters show a lot of variability in phonological contrast implementation; interestingly, although the two categories are clearly marked by two peaks in VOT and closure duration distribution for Group 3 (control group), the degree of variability within this group clearly increased when compared to 1.1. The tendency to mark two categories by use of either parameter can be observed in experimental groups: judging from the distribution of the data, the VOT seems to be used more consistently than closure duration by both groups. The above observation is borne out by statistical tests run on the data for each group and each parameter separately: the use of VOT, although significantly different for both Polish groups from the English group in the case of a phonologically voiceless stop (but not a voiced one, see t-tests T 1.2.1 and T 1.2.7) does not differentiate the two Polish groups. Closure duration, on the other hand, is used significantly differently by each of the three groups in the implementation of [t] and [d].

Experiment	Parameter	Group	Source	F	p
1.2.1.	VOT	1/2	Group	1.32	0.527
			Voicing	67.23	0.000**
			Interaction	1.86	0.1775
1.2.2.	cl dur	1/2	Group	13.86	0.0007**
			Voicing	58.43	0.0000**
			Interaction	3.47	0.067 (*)

Table 7: Analysis of Variance results for the VOT and closure duration values for Group 1 and 2 in Experiment 1.2; Factor A: Group membership, B: phonological voicing, split-plot.

The two ANOVAs (A 1.2.1-1.2.2.) testing the use of the two parameters by the two experimental groups, present a clear picture of contrastive use of VOT by both groups, with the pattern of VOT values distribution not dependent on the group membership, supplemented by a contrastive use of closure duration, significantly different for each group. The results seem to point to the failure to acquire a native-like command of the VOT use in phonetic implementation of voicing for word-medial, intervocalic coronal stops by both groups; the native-like use of closure duration can be seen in group 2, while the use of this parameter by group 1 is also much closer

to a native-like than the use of VOT. The sociolinguistic hypothesis is thus supported in the case of the use of closure duration, but not the VOT: both groups seem to find it equally difficult to implement native-like VOT values, whereas group 2 has been more successful in the acquisition of a native-like use of closure duration in the implementation of stop consonant voicing.

The results of correlation (Corel. 1.2, see Appendix) between the two parameters, however, call for caution in drawing far-reaching conclusion as to the relationship between the parameters: only the native speaker group use the two parameters in a highly significantly correlated way. Interestingly, it is the use of closure duration by the speakers of Group 1 that is significantly correlated to the native-speaker use of the same parameter; this result questions the conclusion reached on the basis of t-tests and ANOVAs: however, as the degree of variability in Group 1 tends to be smaller than in Group 2, it is the consistency in the parameter use that results in significant correlation between Group 1 and Group 3. Consequently, the tendency to hypercorrection and unsystematic variability in Group 2 noticed in 1.1. surfaces again, resulting in a more complex picture of parameter acquisition relationships between the two experimental groups.

Ex. 1.3. 'Vt/d.V'

Experiment 1.3. focuses on the influence of a word boundary on the use of the two parameters tested in 1.2.: how does a word boundary affect the strategies for [voice] implementation? Although the data for this part of the experiment are less numerous, we have included this section hoping to uncover some functionally governed tendencies in the parameter use. The stress pattern in the entries for 1.2. and 1.3. has been kept constant, i.e. the stop cognates occur in post-stress positions (notice, however, the difference in syllable structure: post-stress stops in 1.2. are syllable-initial, whereas the post-stress stops in 1.3. are syllable-final).

The analysis of the data and the results of test statistics point to one major difference between experimental groups and the control group: for all subjects in Group 3 phonetic implementation of a voiceless coronal stop involves continuous friction rather than a stop consonant. Consequently, there is no total occlusion phase in articulation, manifested by a lack of

a stop in the acoustical signal. In the analysis of these cases the closure duration values have been given value '0', while friction duration has been treated as equivalent to the VOT parameter.

In view of the above observation, the problem of the 'norm' and the characteristics of a target value needs to be reconsidered: although the tendency to add affrication to stop consonants, and ultimately change them into continuant segments is an attested tendency in RP (Dr. A. Crompton, personal communication), it is difficult to specify its frequency and influence on the second language users. As a style-dependent tendency, it can be expected to have a greater influence on Group 2 speakers, who can be hypothesized to misinterpret the friction noise as strong aspiration.

Phonetic implementation strategies employed by Group 1 and Group 2 have been tested by means of a series of ANOVAs, checking the relationship between the groups with respect to each parameter (VOT – 'a', and closure duration 'b'). The results show that although the category distinction is maintained, it is done with the use of closure duration cue rather than VOT.

Experiment	Parameter	Group	Source	F	p
A 1.3.1.	VOT	1/2	Group	1.98	0.174
			Voicing	3.10	0.09
			Interaction	0.96	0.342
A 1.3.2	cl dur	1/2	Group	6.29	0.0210**
			Voicing	10.82	0.0041***
			Interaction	0.03	0.8619

Table 8: Analysis of Variance results for the VOT and closure duration data in Group 1 and 2 for Experiment 1.3, split-plot design.

Moreover, whereas both groups use VOT in a similarly insignificant way to mark voicing, they are significantly different in the use of closure duration (see ANOVA 1.3.1. and A 1.3.2, Table 8); however, the combination of the two factors (group membership and phonological voicing) yields the result close to 1, meaning that the degree of variability excludes the possibility of finding any regularities in the group related pattern of closure duration use.

The within-group ANOVAs (A 1.3.3.-1.3.6, Table 9) testing the influence of context, i.e. the presence of a word boundary and the difference in syllable position on the use of VOT and closure duration in voice implementation, show that the only statistically significant difference in parameter duration is present in the VOT use for voice implementation in Group 2 (factor A, voicing, in A 1.3.5).

Experiment	Parameter	Group	Source	F	p
A 1.3.3. Vt/d.V/Vt/dV	VOT	1	voicing	0.12	0.734
			context	2.17	0.1725
			interaction	7.13	0.0248**
A 1.3.4. Vt/d.V/Vt/dV	cl dur	1	voicing	1.15	0.3135
			context	0.28	0.6133
			interaction	44.66	0.0001**
A 1.3.5. Vt/d.V/Vt/dV	VOT	2	voicing	5.68	0.0397*
			context	0.08	0.7750
			interaction	13.82	0.0048***
A 1.3.6. Vt/d.V/Vt/dV	cl dur	2	voicing	0.03	0.868
			context	1.13	0.317
			interaction	8.29	0.0177**

Table 9: The results of within-group ANOVA for Groups 1 and 2 for the data in Ex.1.2 and 1.3; Factor A: phonological voicing, Factor B: context, repeated measure design.

The effect of context (factor B) does not reach significance in any context difference or parameter. Interestingly, however, the interaction between the two factors, i.e. phonological voicing and context prove highly significant for both parameters in both groups, with closure duration reaching a much higher level of significance than VOT in Group 1, and a reversed tendency in Group 2.

Both groups prove to use phonetic parameters consistently in the interaction of voicing and context: for group 2, the VOT values are used with a higher significance level than the closure duration, which implies the tendency to rely primarily on the VOT in implementation of context-specific voicing, when compared to the tendency to differentiate between positions by means of the difference in closure duration for Group 1.

The exact relationships between individual parameter use in different groups can be further specified on the basis of the mean value compari-

son by means of the t-test for correlated samples. Summarised results are given in Table 10.

Experiment	Parameter	Group	Count	Mean	t	p
T 1.3.1.	VOT	1	10	38.4		
Vt.V/Vd.V				10	62.2	-1.59 0.1620
T 1.3.2.	cl dur	1	10	70.9		
Vt.V/Vd.V				10	98.50	-3.39 0.0079**
T 1.3.3.	VOT	2	10	28.00		
Vt.V/Vd.V				10	34.80	-0.92 0.385
T 1.3.4.	cl dur	2	10	41.00		
Vt.V/Vd.V				10	65.00	-1.77 0.103
T 1.3.5.	VOT	3	5	25.20		
Vt.V/Vd.V				5	50.80	-5.13 0.0081**

Table 10: Mean comparison results for Groups 1,2, and 3: within-group t-tests for the data in Ex.1.3.

The results of t-tests parallel the Analysis of Variance results to the extent that they support the contrastive use of closure duration by Group 1 speakers. The variability present in the data prevents the results from reaching the level of statistical significance in the case of the VOT in Group 1, and either parameter in Group 2 (notice that t-test proves to be more conservative than ANOVA in this case). The results of the data measured for Group 3 (friction duration) are highly significant: whatever the nature of the strategy employed by the native speakers may be, they invariably produce significant contrast implemented by a chosen parameter.

The tendency to use different parameters in context-sensitive voice implementation by different groups needs to be stressed. The use of the VOT in group 2 and closure duration in Group 1 seems to support the hypothesis formulated earlier on the basis of the data elicited from the native speakers of English. However, the results need to be interpreted with caution, as the number of observations is too small to allow drawing firm conclusions. Nevertheless, the fact that a tendency predictable on socio/psychological grounds finds support in the experimental results deserves mention.

Ex.1.4. ‘V.t/dV’

The sociolinguistic hypotheses are further tested for the use of phonetic temporal parameters in word-initial, post-vocalic position by the experimental groups. T-tests on the use of the two parameters by the groups (T 1.4.1-T 1.4.12) point to a highly significant difference between the groups in the use of closure duration as a cue for voicing (T 1.4.4., 1.4.5, 1.4.6.). The use of the VOT differentiates Group 1 from Group 3 (T 1.4.2.) but not from Group 2 (see Tables 11 and 12).

Tables 11 and 12 present two sets of data: for [t] and [d] entries respectively. The main observation to be made at this point seems to be the fact that the statistical procedure failed to yield significant results for [d] in the case of the Polish groups, and reached significance (T 1.4.12) or came very close to it (T 1.4.11) in the case of Polish vs. Native Group use of closure duration, which is consistently longer in the speech of second language speakers.

However, the differences in the use of particular parameters in the implementation of [t] proved to be highly significant in several cases: mean closure duration was found to be significantly different in terms of absolute duration in all the three groups. The VOT, on the other hand, proved to be significantly shorter for Group 1 than Group 3.

Experiment	Parameter	Group	Count	Mean	t	p
[t]						
T 1.4.1.	VOT	1	10	43		
V.tV1/2		2	10	57.4	-1.43	0.1690
T 1.4.2.	VOT	1	10	43		
V.tV1/3		3	5	69.2	-2.72	0.023**
T 1.4.3.	VOT	2	10	57.4		
V.tV2/3		3	5	69.2	-1.08	0.300
T 1.4.4.	cl dur	1	10	123.5		
V.tV1/2		2	10	87.3	2.6	0.018**
T 1.4.5.	cl dur	1	10	123.5		
V.tV1/3		3	5	53.40	5.25	0.0002***
T 1.4.6.	cl dur	2	10	87.3		
V.tV2/3		3	5	53.40	2.98	0.0110**
[d]						
T 1.4.7.	VOT	1	10	16.2		
V.dV1/2		2	10	16.7	-0.19	0.842
T 1.4.8.	VOT	1	10	16.2		
V.dV1/3		3	5	15.8	0.17	0.862
T 1.4.9.	VOT	2	10	16.7		
V.dV2/3		3	5	15.8	0.47	0.652
T 1.4.10.	cl dur	1	10	98.8		
V.dV1/2		2	10	97.4	0.12	0.901
T 1.4.11.	cl dur	1	10	98.8		
V.dV1/3		3	5	72.2	05	0.06
T 1.4.12.	cl dur	2	10	97.4		
V.dV2/3		3	5	72	2.41	0.042*

Tables 11 and 12: t-test results for [t] and [d] entries in Ex.1.3., for Groups 1, 2, 3.

Split-plot, 2 factor ANOVAs (A 1.4.1. and A 1.4.2) confirm the t-test results to the extent that closure duration is found to be significantly different in Group 1 and Group 2. The interaction between group membership and voicing is close to the level of significance; notice, however, that voicing is highly significantly implemented by the VOT values in both groups (A 1.4.1., see Table13).

Experiment	Parameter	Group	Source	F	p
A 1.4.1.	VOT	1/2	Group	1.75	0.20
			Voicing	50.46	0.0000***
			Interaction	2.14	0.16
A 1.4.2.	cl dur	1/2	Group	4.09	0.055*
			Voicing	0.69	0.42
			Interaction	3.93	0.06 (*)

Table 13: Split-plot ANOVA results for [t] and [d] entries in the context V/t/dV in Group 1 and Group 2.

The relationship between context and voice implementation has been further examined with reference to word-initial stops in running speech in the course of this part of Experiment 1 (1.4). Phonetic implementation strategies employed by subjects in running speech have been compared to the strategies employed in a word-list style word-initial stop voicing (Ex. 1.1.) on the one hand, and word-medial, syllable-initial (Ex. 1.2.) on the other. The effect of syllable position has been also investigated by means of ANOVAs comparing the use of VOT and closure duration in Ex. 1.4. with Ex. 1.3.

As in 1.3., the number of observations in 1.4. is too small to allow firm conclusions; this major drawback notwithstanding, the analysis of the data enables us to find certain tendencies and to strengthen or weaken the predictions formulated on the basis of other parts of the experiment. In particular, we want to find out whether the pattern of the VOT values noticed in Ex.1.1. corresponds to Ex.1.4., i.e. to a less-formal, and predictably less monitored context (further analysis along the same lines is reported in Ex.2).

Experiment	Parameter	Group	Source	F	p
A 1.4.3.	VOT	1	Voicing	13.99	0.0047***
1.1./1.4.			Context	18.86	0.0020***
t/dV-V.t/dV			Interaction	4.52	0.06 (*)
A 1.4.4.	VOT	2	Voicing	3.28	0.101
1.1./1.4.			Context	57.94	0.000***
t/dV-V.t/dV			Interaction	2.94	0.117
A 1.4.5.	VOT	2	Voicing	0.70	0.42
1.3./1.4.			Context	7.46	0.0225**
Vt/d-V.t/d			Interaction	29.51	0.0005***
A 1.4.6.	cl dur	2	Voicing	36.48	0.0002***
1.3/1.4.			Context	9.50	0.0128**
Vt/d-V.t/d			Interaction	0.38	0.5597
A 1.4.7.	VOT	1	Voicing	2.27	0.164
1.3/1.4.			Context	0.003	0.855
Vt/d-V.t/d			Interaction	9.28	0.0136**
A 1.4.8.	cl dur	1	Voicing	9.19	0.0139**
1.3/1.4.			Context	0.03	0.85
Vt/d-V.t/d			Interaction	11.44	0.008***
A 1.4.9.	VOT	1	Voicing	0.18	0.685
1.2/1.4.			Context	15.33	0.0036***
Vt/dV-V.t/d			Interaction	0.19	0.678
A 1.4.10.	cl dur	1	Voicing	7.98	0.019**
1.2/1.4			Context	19.11	0.0019***
Vt/dV-V.t/d			Interaction	1.02	0.3411
A 1.4.11	VOT	2	Voicing	0.62	0.456
1.2/1.4			Context	26.02	0.0007***
Vt/dV-V.t/d			Interaction	0.30	0.5991
A 1.4.12	cl dur	2	Voicing	25.24	0.0008***
1.2/1.4			Context	1.22	0.298
Vt/dV-V.t/d			Interaction	7.85	0.02**

Table 14: The results of within-group Analyses of Variance.

A number of ANOVAs have been calculated to test different types of relationships. The within-group tests, aiming at checking the hypotheses of context-dependent use of the VOT and closure duration as cues for voicing are presented in A 1.4.3.-1.4.12. The results of these tests allow us to form predictions as to the degree of consistency in the use of particular cues, which reflect the degree of acquisition of a given parameter. Summarised results obtained from the repeated measure ANOVA run for each group are given in Table 14. The use of the VOT in the implementation of stop voicing in syllable initial, prestress position was tested in NOVAS

A 1.4.3, A 1.4.4. In Group 1, both voicing and context are highly significantly differentiated by the use of VOT, although the interaction of the two factors only approaches the level of significance, not reaching it ($p < 0.06$). In Group 2, however, although the effect of context is highly significant, neither voicing nor the interaction between the variables approaches the level of significance. This somewhat strange result reflects the degree of variability within the group: once again, it seems that although the tendency to approach native-like values for phonetic parameters is greater in this group, the degree of variability reflecting the nature of the subjects' phonological system development results in a rather 'messy' picture of the relationships between the parameters.

The consistency in the use of two parameters: VOT (a) and closure duration (b) under different types of functional conditioning, i.e. in syllable-initial, word-medial position (see ANOVA 1.4.9-1.4.12) and syllable-final, word-final position in running speech (see ANOVA 1.4.5-1.4.8) has been checked by means of further tests of significance: the results point to a general tendency to rely on closure duration as a major cue for context-dependent stop consonant voicing implementation. The VOT values, although used in a significantly different way by each group, are not distributed in a systematic way, pointing to the dynamic process of acquisition 'in action'.

Ex. 1.5. 'Vt/d.'

The last part of Experiment 1 increases the number of investigated temporal parameters by vowel duration. As we are concerned with word-final, phrase-final stop consonant voicing contrast, the parameters used as cues for voicing change: vowel duration and closure duration are recognised as the basic acoustical cues in the pre-pausal context. Consequently, the VOT is not measured or discussed in this context: we shall return to this parameter in Experiment 2.

Phonological and phonetic vowel duration is a subject matter of Experiment 3: in Ex.1.5. it is investigated as one of the temporal parameters used in phonetic implementation of voicing, and its relationship to the other parameter, closure duration, is considered. In the first step, the relationship

between the parameters is tested within each group; in the second step, the use of particular cues for voicing between the groups is compared.

The distribution of closure duration and vowel duration data supports the prediction that both cues are used by the subjects in phonetic implementation of phonological voicing; however, the pattern of distribution of each parameter and the relationship between the two parameters differ between the groups. Group 1 tends to use longer closure durations than Group 2 (the difference between the groups closely approaches the level of significance, but does not reach it, see ANOVA 1.5.1); the range of vowel duration is again wider in Group 2 than Group 1: although the difference does not approach the level of significance (ANOVA 1.5.2.), the tendency can be seen in the distribution of the data.

Experiment	Parameter	Group	Source	F	p
A 1.5.1. vowels t/d	cl dur	1/2	Group	3.23	0.0711
			Voicing	68.45	0.000***
			Interaction	0.30	0.591
A 1.5.2. vowels t/d	v dur	1/2	Group	1.37	0.242
			Voicing	112.84	0.000***
			Interaction	0.01	0.909
A 1.5.3. shortv t/d	cl dur	1/2	Group	1.0	0.323
			Voicing	54.38	0.000***
			Interaction	0.00	0.964
A 1.5.4. longv t/d	cl dur	1/2	Group	2.56	0.111
			Voicing	19.11	0.0001***
			Interaction	0.48	0.496
A 1.5.5. shortv t/d	v dur	1/2	Group	8.85	0.0043***
			Voicing	46.72	0.000***
			Interaction	0.80	0.379
A 1.5.6. longv t/d	v dur	1/2	Group	0.02	0.877
			Voicing	49.74	0.000***
			Interaction	1.33	0.257

Table 15: Summarised results of between-the- groups Analysis of Variance for the data in Ex.1.5.; Factor A: Group membership, B: phonological voicing, split-plot.

There are two types of conditioning in vowel duration differences: inherent vowel duration and context-dependent duration, used as a cue for voicing of the following consonant. This double relationship is tested in ANOVAs 1.5.11-1.5.13 for individual groups: the results show that all

groups use highly significantly different inherent vowel durations (factor A) and context-dependent ones; the interaction between the two factors, i.e. the relationship between context-dependent use of vowel duration in the case of inherently long and short vowels is insignificant in Group 1, but highly significant in Group 2 and Group 3. Context-dependent vowel duration is highly significantly used for both groups in voice implementation; the groups use the cue significantly differently in the case of inherently short, but not long vowels. This result can be interpreted as the difference in the acquisition of phonetic lengthening with respect to inherently long and short vowels of English: the direction of differences is further investigated in Ex.3.

Experiment	Parameter	Group	Source	F	p
A 1.5.11	v dur	1	Phon.dur	53.25	0.0000***
			Voicing	49.09	0.0000***
			Interaction	0.36	0.5594
A 1.5.12	v dur	2	Phon.dur	161.12	0.0000***
			Voicing	49.54	0.0000***
			Interaction	5.85	0.0211**
A 1.5.13	v dur	3	Phon.dur	181.45	0.0000***
			Voicing	136.09	0.0000***
			Interaction	47.36	0.0000***

Table 16: Summarised results of within-group Analysis of Variance for each group for the data in 1.5; Factor A: Phonological duration of a vowel (long vs. short), Factor B: phonological voicing of the following consonant; repeated measure design.

The relationship between the parameters has been found highly significant for all three groups: ANOVAs 1.5.7-1.5.9. present the results of the tests aiming at establishing the relationship between two factors: phonological voicing and two temporal parameters used in implementation. Clearly, the parameters are related to each other within each group, as the Analysis of variance yields highly significant results for both factors (A: Voicing, B: Parameter), as well as for the interaction of the factors.

The relationship between the sums of two parameters is tested by means of a split-plot Anova A 1.5.14 (Table 17): the results point to a highly significant difference in cumulative parameter use dependent on phonological voicing; moreover, the use of cumulative parameters approaches the

level of significant difference between the two experimental groups. The interaction between the parameter and the group, however, is virtually nonexistent: once again, the degree of variability within the data excludes the possibility of finding regularities in group-related use of voice implementation parameters.

Experiment	Parameter	Group	Source	F	p
A 1 A.5.14	v dur	1/2	Group	3.28	0.069(*)
	cl dur		Voicing	15.53	0.0002***
			Interaction	0.13	0.724

Table 17: Analysis of Variance for the sum duration of two parameters: vowel duration and closure duration in Group 1 and 2 for data in Ex.1.5; Factor A: Group membership, B: phonological voicing, split-plot design.

The tendency for invariance, although attested in the data, cannot be viewed as a driving force in the production of second language users: the evidence for compensatory temporal function of the two parameters is not convincing. Thus temporal relationship between parameters requires further study with reference to non-native English as well as native English (Fowler, 1992).

Experiment 2

Experiment 2 explores the use of aspiration – long VOT values, in the implementation of a voiceless plosive in word-initial and word-final position when followed by a vowel. We shall discuss the use of a single temporal parameter in a phonologically voiceless stop implementation, trying to find possible regularities within this particular parameter use by the second language users of English. The sociolinguistic hypothesis of group membership influence on the acquisition of native-like use of the parameter is tested in a series of phonologically motivated hypotheses, which investigate the relationship between particular morphological or phonological conditioning in the use of the VOT. In the first part of Experiment 2, the data given in 2.1. and 2.2. are described for the pattern of distribution. The results are surprising in the degree of variability in Group 3 in the case of 2.2. group of data (i.e. intervocalic, word-medial position); the distribution

of the VOT values for other groups in (2.1.) and (2.2) approaches normal distribution.

From the point of view of a phonetic category implementation, better-marked context for a new category (voiceless aspirated) seems to be given special attention by subjects (compare the results of A 1.4.3 and A 1.4.4: both groups 1 and 2 use the VOT values in a highly significantly different way in post-pausal word-initial voiceless stops vs. word-initial stops in running speech, parameter 'context' in both ANOVAs).

The relationship between context (Factor B) and group membership (Factor A) in the use of VOT in the above contexts is tested in ANOVA A 2.1. The results indicate that although the position is highly significantly differentiated by the VOT use by both groups, each group uses random patterns of the VOT values in implementation: the interaction of two variables is strikingly insignificant when compared to the level of significance of individual factors.

Experiment	Group	Source	F	p
A 2.1. tV-VtV	1/2	Group	7.18	0.0093***
		Context	26.51	0.0000***
		Interaction	0.22	0.6454
A 2.2. t.V-VtV	1/2	Group	8.99	0.0041***
		Context	0.07	0.7936
		Interaction	0.25	0.6216
A 2.3. tV-t.V	1/2	Group	4.12	0.0445*
		Context	17.50	0.0001***
		Interaction	0.01	0.9353

Table 18: Analysis of Variance results for the data in Ex.2 for Group 1 and Group 2; Factor A: Group membership, B: context for [t], split-plot design.

In the second step, the VOT values in implementation of word-final intervocalic stop consonants are compared across groups and other contexts (i.e. 2.1., 2.2.). The differences in frequency distribution of the data need to be mentioned here: the distribution is most regular in Group 1, with groups 2 and 3 using more variable VOT values. The variability in implementation of word-final stops has already been mentioned in Ex.1.3; in Ex. 2. the tendency to use different VOT values in this position is given

more support¹⁵. The ANOVA results (see Table 18) strongly support the sociolinguistic hypothesis claiming a significant difference between Group 1 and Group 2 in the use of phonetic parameters. Group membership proved highly significant in all contexts investigated in Experiment 2. However, although the VOT values used in each group are significantly different, the context is significantly marked by the use of the VOT in the case of initial vs. medial stops and initial vs. final. This seems to suggest that the implementation of a voiceless stop in initial position receives special attention and is clearly marked in the speech of both groups of the subjects. As noticed before, the lack of significant result of interaction in any case reflects the lack of a systematic pattern in the implementation system.

The significance of the VOT use in implementation across three different contexts has been further tested by a number of t-tests for correlated samples: T 2.4-2.9 in order to uncover the exact relationships suggested by the ANOVAs. The t-tests for correlated samples test the within-group relationship between the VOT values in the implementation of postpausal, word-initial stops ($tV_{1,2,3}$) and word-medial stops ($EVtV_{1,2,3}$): for all groups, the initial position tends to be marked by statistically highly significant difference in the VOT. This regularity is not matched by the results in any other position. Notice, however, that in Group 3 the level of significance is relatively lower: this result indicates a tendency for Polish groups to tend to use a larger difference in the VOT value for marking word-initial position vs. any other position, which may lead to a hypercorrect usage of aspiration.

¹⁵ The variability of the VOT values is strictly connected with the tendency to produce affricated stops or fricatives rather than true stop consonants in RP; as this tendency does not seem to have influenced the acquisition pattern of Polish subjects, we shall not develop this issue here.

Experiment	Group	Context	Count	Mean	t	p
T 2.1.	1	tV	30	63.13		
tV-VtV	1	VtV	30	38.60	4.07	0.0004***
T 2.2.	2	tV	30	74.07		
tV-VtV	2	VtV	30	53.63	3.233	0.0031***
T 2.3.	3	tV	15	91.27		
tV-VtV	3	VtV	15	76.67	2.226	0.0002***
T 2.6.	1	tV	30	63.13		
tV-t.V	1	t.V	30	42.30	2.84	0.0079***
T 2.8.	2	tV	30	74.07		
tV-t.V	2	t.V	30	52.43	3.080	0.0045***
T 2.4.	3	tV	15	91.27		
tV-t.V	3	t.V	15	46.13	5.117	0.0002***
T 2.7.	1	VtV	30	38.60		
VtV-t.V	1	t.V	30	42.30	-0.63	0.5405
T 2.9.	2	VtV	30	53.63		
VtV-t.V	2	t.V	30	52.43	0.155	0.8725
T 2.5.	3	VtV	15	76.67		
VtV-t.V	3	t.V	15	46.13	2.685	0.0175**

Table 19: T-test results for the data in Ex.2, paired score t-tests.

When compared to the native speaker group, the second language speakers fail to mark the difference between word-medial and word-final position. The mean values used in the tests show that the lack of significant difference is due to the tendency to use shorter VOT values in medial position when compared to the final one. Clearly, the subjects in both groups implement one type of contrast: long VOT vs. shorter VOT, which does not allow them to accommodate the third, medial duration used by the native speakers in implementation of word-medial position as distinct from the initial or final one.

Experiment 3

The acquisition of phonological and phonetic vowel duration by the second language users of English is investigated in Experiment 3. The socio-linguistic hypothesis claiming the difference in the acquisition of durational characteristics of English vowels is tested in the course of a number of experiments. Phonological conditioning for phonetic lengthening of vowel duration is tested by parametric tests of significance on context-dependent vowel duration differences in inherently long and short vowels.

The research questions asked in this experiment concern temporal characteristics of the vowel system acquired by the subjects: we want to establish whether phonological vowel duration has been acquired, i.e. whether the vowel system of the investigated L2 speakers contains a regular pattern of inherent vowel duration distribution, and whether phonetic vowel duration differences used as a cue for voicing follow a native-like pattern. Furthermore, we want to establish the relationship, if any, between the two durational aspects of the L2 vowel system.

Ex. 3.1. Phonological Vowel Duration

The nature of the durational aspect of vowel system in each group is investigated on the basis of the data in 3.1.-3.5. The basic research question: “Does inherent vowel duration difference form a part of the cognitive phonological system of subjects?” forms a pre-requisite for further analysis of possible between-group differences in the implementation of phonological and phonetic vowel duration. The distribution of values indicates large differences in the temporal organisation of the vocalic system of the three groups: whereas the distribution of vowel durations clearly indicates the existence of two separate vowel categories distinguished by duration, the distribution in the two Polish groups tends to be more variable than that of the control group. The distribution shows that Vowel durations in Group 1 tend to cluster around two peaks in inherent vowel duration data H 3 and – less regularly – , when vowels are followed by a phonologically voiceless stop. However, when followed by a voiceless stop, the value show a high degree of variability. The conclusions reached on the basis of frequency distribution of the data are supported by within-group test of significance (T 3.1.1), which gives a highly significant result for the difference between vowel durations in inherently long and short vowels. Interestingly, group 2 exhibits a tendency for greater regularity in the distribution of the data in the context most difficult for Group 1, i.e. when vowels are followed by phonologically voiceless stops. A number of two-sample t-tests check the relationship between the group-dependent vowel duration use (T 3.1.10-3.1.25): significantly different vowel durations have been found to be used by Group 1 and Group 2 for short vowels in the following context of /d/ or /t/ (T 3.1.17, 3.1.19). Group 1 and Group 3 differ in the values

for vowel duration in the case of vowels followed by /t/ (T 3.1.14), long and short vowels followed by /t/ (T 3.1.22, T 3.1.23) and short vowels followed by /d/ (T 3.1.21).

The relationship between group membership and inherent vowel duration in the use of vowel durations is tested in ANOVAs A 3.1.1. and 3.1.2. (Table 20). Both analyses of variance provide highly significant results for factor B (inherent vowel duration); the interaction between the factors reaches the level of high significance for vowel durations used in the following context of a phonologically voiced consonant /d/. This result allows us to establish the degree of reliability of t-test results, i.e. the extent to which within-group variability, or the distribution of the data in both groups are responsible for the lack of systematic relationship between the investigated factors.

Experiment	Group	Source	F	p
A 3.1.1. shortv [t]- longv [t]	1/2	Group	0.81	0.3762
		Phon V dur	120.27	0.0000***
		Interaction	7.73	0.0072**
A 3.1.2. shortv [d]- longv [d]	1/2	Group	1.51	0.2216
		Phon V dur	82.53	0.0000***
		Interaction	1.20	0.2784

Table 20: The results of Analyses of Variance for the data in Ex 3.1 for Groups 1 and 2; Factor A: group membership, B: phonological duration of the vowels; split plot design.

Inherent vowel duration differences in 4 pairs of vowels (see data 3.3.,3.4) have been tested for significant difference within each group (T 3.1.27-T 3.1.38) and the relationship between group use and inherent vowel duration (A 3.1.3-3.1.6, see Table 21).

Experiment	Group	Source	F	p
A 3.1.3. i:/i d	1/2	Group	1.26	0.2758
		i:/i	43.37	0.0000***
		Interaction	1.09	0.3125
A 3.1.4. o/o:	1/2	Group	1.60	0.2201
		o/o:	56.82	0.0000***
		Interaction	0.25	0.6281
A 3.1.5. u/u:	1/2	Group	0.00	0.9782
		u/u:	28.46	0.0001***
		Interaction	5.24	0.0328**
A 3.1.6. a:/e	1/2	Group	0.02	0.8769
		a:/e	53.08	0.0000***
		Interaction	3.13	0.903

Table 21: Vowel-pair Analyses of Variance results for the data in Experiment 3.1 for Group 1 and 2; Factor A: group membership, B: phonological vowel duration for individual pairs of vowels; split-plot design.

The above results confirm for all paired observations, vowel duration difference between inherently short and long vowels proves to be highly significant. The relationship between the groups, however, is insignificant in all cases: both Polish groups implement inherent vowel duration following the same pattern. It is noteworthy, however, that the interaction between the two factors, i.e. group membership and inherent vowel duration, reaches the level of significance in the case of one pair of vowels: [u] and [u:].

Ex. 3.2. Phonetic Vowel Duration

Vowel duration as a cue for voicing of the following stop in word-final position has already been mentioned in Ex.1.5. However, a more detailed analysis of the relationship between phonological and phonetic vowel duration is attempted in the second part of Ex.3, as the continuation of findings reported in the first section. As both experimental groups have been found to implement phonological vowel duration in their production, we can investigate context-dependent lengthening from the perspective of a vocalic system phonetic implementation. Context-dependent differences in vowel duration have been first tested for significance within each group: the procedure has established the tendency for highly significant differenc-

es between the durations of long vowels followed by /d/ vs. /t/ and short vowels followed by /d/ vs. /t/ respectively in all the groups. The Analyses of variance across the groups in A 3.2.1. and 3.2.2. (Table 22) confirm highly significant difference in context-dependent vowel durations in both groups; moreover, the groups are found to differ significantly in the implementation of context-dependent, phonologically short vowels. The interaction between the two factors is similarly insignificant in both cases.

Experiment	Group	Source	F	p
A 3.2.1.	1/2	Group	0.0	0.8915
longv[t]		Voicing	69.53	0.0000***
longv[d]		Interaction	0.80	0.3784
A 3.2.2.	1/2	Group	8.85	0.0043***
shortv[t]-		Voicing	46.72	0.0000***
shortv[d]		Interaction	0.80	0.3789

Table 22: Analyses for Variance for the data in Ex.2.2 for Group 1 and 2; Factor A: Group membership, B: phonological voicing of the following consonant, split-plot design.

The group membership effect on differences in phonetically-motivated vowel durations is further examined in the course of a number of statistical procedures; the data for the tests have been converted into the ratio of an expectedly longer duration, i.e. the duration of a vowel before a phonologically voiced consonant /d/, to an expectedly shorter duration of the same vowel in the following context of /t/. The results of the between-group ratio differences in the case of phonologically long vs. short vowels are investigated in T 3.2.1- 3.2.3 (see Table 23): statistically significant differences have been found between Groups 1 and 2 and Group 3 for the ratios in vowels grouped as in data 3.2 and 3.2. This result suggests that both Polish groups use phonetic vowel duration significantly differently from the native speakers of English. In view of the previous results pointing to a highly significant influence of the following stop voicing on vowel duration in both Polish groups, we can conclude that although Polish groups use vowel duration as a cue for voicing, the degree of lengthening/shortening effect of the context is significantly smaller in either Polish group than in the native speaker group.

Experiment	Group	Count	Mean	t	p
T 3.2.1.	1	60	1.417		
	2	60	1.422	-0.06	0.953
T 3.2.2.	1	60	1.417		
	3	60	1.598	-2.10	0.037**
T 3.2.3.	2	60	1.422		
	3	60	1.598	-2.14	0.0342**

Table 23: T-test results for the ratios of expectedly longer vowel duration (v[d]) to the expectedly shorter durations of the same vowels (v[t]) in Groups 1,2,3.

Group ratios for individual vowels are further compared in t-tests T 3.2.8-3.2.25 (see Table 24). The results confirm the prediction that context-dependent vowel duration implementation is generally more difficult in the case of phonologically long vowels: the ratio of a phonetically long to phonetically short vowel duration is significantly different for Group 1 vs. Group 3 in the case of [u:] (T 3.2.24). Group 2 differs from Group 3 in the ratio for [o:] (T 3.2.22) and [u:] (3.3.25); the two Polish groups differ in the ratio of durations for [a:] (3.2.14).

Experiment	Group	Count	Mean	t	p
2.2.8	1	10	1.534		
[e]	2	10	1.619	-0.37	0.7135
2.2.9.	1	10	1.534		
[e]	3	5	1.526	0.042	0.9658
2.2.10.	2	10	1.619		
[e]	3	5	1.526	0.597	0.5667
2.2.11.	1	10	1.399		
[ɑ]	2	10	1.139	1.314	0.2063
2.2.12.	1	10	1.399		
[ɑ]	3	5	1.547	-0.54	0.603
2.2.13.	2	10	1.139		
[ɑ]	3	5	1.547	-1.72	0.1346
2.2.14.	1	10	1.509		
[a:]	2	10	1.813	-2.05	0.0526*
2.2.15.	1	10	1.509		
[a:]	3	5	1.863	-1.80	0.1120 (*?)
2.2.16	2	10	1.813		
[a:]	3	5	1.863	-0.25	0.8029
2.2.17	1	10	1.531		
[o]	2	10	1.395	0.640	0.539
2.2.18	1	10	1.531		
[o]	3	5	1.397	0.555	0.5947
2.2.19	2	10	1.395		
[o]	3	5	1.397	-0.01	0.9867
2.2.20	1	10	1.284		
[o:]	2	10	1.224	0.387	0.7050
2.2.21	1	10	1.284		
[o:]	3	5	1.479	-1.47	0.1667
2.2.22	2	10	1.224		
[o:]	3	5	1.479	-2.70	0.0186**
2.2.23	1	10	1.245		
[u:]	2	10	1.339	-0.59	0.5685
2.2.24	1	10	1.245		
[u:]	3	5	1.778	-3.02	0.0232**
2.2.25	2	10	1.339		
[u:]	3	5	1.778	-2.08	0.0617(*)

Table 24: The results of t-tests on mean ratios of vowel duration.

The analysis of the data indicates that the ratio is significantly smaller for Polish groups than for native speakers in all cases. This result has been expected on the basis of the observations made by Fowler (1992) that the vowel length difference before voiced vs. voiceless plosives in English is exaggerated. When the results of the comparison are examined, even when

the difference in the ratio does not reach the level of significance, the same tendency can be observed. One of the problems connected with marking the level of significance needs to be mentioned here: although true for all parametric tests of significance used in the statistical procedure based on P.C.Tab results, it seems particularly important in the case of the ratio data.

The levels of significance accepted in the results cited so far have been set according to the most conservative methods of analysis, i.e. with the confidence interval deciding about the number of degrees of freedom. In a less rigid, commonly used methodology, levels of significance are marked on the basis of degrees of freedom corresponding to the number of all entries. However, as such a less rigid methodology does not accommodate for instances of deviant data distribution, we decided to adopt to check all tests for the two-tailed relationship which requires higher results for reaching the assumed level of significance, in order to ensure that we minimise the danger of claiming significant relationships in cases when they do not exist. In other words, an effort has been made to minimise the possibility of type 1 error consisting in exaggeration of the significance of differences; we hope that we have also managed to avoid type 2 error, i.e. the opposite effect of not noticing significant differences where they really do exist.

3.5. The results of hypotheses testing – a summary

Phonetic experiments reported in this chapter aimed at testing the sociolinguistic hypotheses formulated and motivated in Chapter 2. The non-directional hypothesis claims that the difference in the distance and attitude towards the majority language speech community influences the pattern of second language acquisition. The directional hypothesis predicts the direction of difference, claiming that Group 2 is more successful in the acquisition of the second language due to a smaller distance and more assimilatory acculturation patterns. The independent variable of socio-psychological distance and acculturation has been investigated by means of three dependent variables – phonetic temporal parameters: the VOT, closure duration and vowel duration. The phonetic parameters are used in the phonetic implementation of the following phonological and phonetic cat-

egories: voice, phonological vowel duration, aspiration, phonetic vowel duration.

The nondirectional sociolinguistic hypothesis has been supported in those cases when it is possible to state with at least 95% of certainty that the two experimental groups come from different populations, characterized by the value of the independent variable. The existence of a systematic difference has been supported in the following cases:

1. There is a significant difference between experimental groups in the use of closure duration in implementation of voicing in word-medial position (T 1.2.10, A 1.2.2).
2. There is a significant difference between Group 1 and Group 2 in the use of closure duration for marking voicing in word-final position in running speech (the durations are significantly longer for Group 1) (A 1.3.2, T 1.3.2., 1.3.6).
3. Group 1 and Group 2 use significantly different closure durations in the implementation of voicing in word-initial position in running speech (T 1.4.5, A 1.4.2); however, closure durations used by neither group correspond to native-like values (T 1.4.6-1.4.7).
4. Groups 1 and 2 are significantly different in the implementation of aspiration in word-initial vs. word-medial stop position (A 2.1, T 2.1); however, neither of the groups uses VOT values in a native-like way (T 2.2.-2.3.).
5. Groups 1 and 2 differ in the use of aspiration in word-medial vs. word-final position in running speech (A 2.2).
6. Groups 1 and 2 differ in the use of aspiration in word-initial vs. word-final position in running speech (A 2.3).
7. Phonological vowel duration, although implemented by both groups, differentiates Group 1 from Group 2 in vowel durations for short vowels (T 3.1.17., 3.1.19).
8. Phonetic vowel duration implementation differs in Groups 1 and 2 in the case of phonologically short vowels (A 3.2.2).
9. Phonetic vowel implementation is different between the two groups in the case of one of six investigated vowels: [a:]; neither group produces the lengthening effect corresponding to the native speaker group (T 3.2.14-3.2.16).

The directional hypothesis, claiming that parameter use is more native-like in Group 2 than in Group 1, is supported in the following cases:

1. Closure duration use in implementation of voicing in word-medial position is closer to native-like implementation in Group 2 than Group 1 (T 1.2.10-1.2.12).
2. VOT values used in word-medial voice implementation are closer to Group 3 in Group 2 than in Group 1 (T 1.2.5-1.2.6); however, both experimental groups use significantly shorter VOTs for /t/ than Group 3.
3. Closure duration values used in implementation of voice in word-final position in running speech are closer to native-like in Group 2 than in Group 1 (T.1.3.3-1.3.4, 1.3.8).
4. VOT values used by Group 2 in implementation of voicing in word-initial position in running speech are significantly closer to native-like than in Group 1 (T 1.4.3-1.4.4); however, the difference between Group 1 and 2 does not reach significance (T 1.4.2).
5. Group 2 produces vowel durations for phonologically short vowels in a more native-like way than Group 1 (T 3.1.22-3.1.26).
6. Group 1 produces more native-like phonetic vowel durations in context-dependent implementation of [o:] (T 3.2.21-3.2.2).

The observed differences in the use of individual parameters by the groups provide evidence as to the relationship between the parameters and phonological contexts in the implementation of the elements of the second language system used by the investigated speakers.

Chapter Four

Conclusion and Pedagogical Implications

The study into the English sound system characteristics of the native speakers of Polish reported here concentrated on second language speakers, acquiring and using English in the natural context. However, the results can be interpreted with reference to all learners of English with the Polish language background. The study recognizes two types of conditioning in second language usage: the socio-psychological and phonological. The above twofold development of the experimental procedure mirrors the twofold dependence of the phonological system, represented here by selected temporal phonetic parameters: they are used in phonetic implementation of the target language by the speakers representing certain socio-psychological condition. The two types of conditioning appear in a factorial design for the Analysis of Variance as “voicing” or “phonological vowel duration” (Factor B), and “group membership” (Factor A) respectively.

The findings reported in Chapter Three support the relevance of the selected parameters. The elements of the sound system chosen for investigation: voice implementation, aspiration and phonetic vowel duration have been found to function as sociolinguistically conditioned markers in the second language speech acquisition situation. Two types of markers (based on Schrerer and Taylor, 1979, see Chapter One) have been distinguished, In the study, the parameters differentiating Polish groups from the English group are recognised as level 1 markers (ethnicity), while the parameters differentiating Group 1 from Group 2 (both being different from Group 3) are recognised as level 2 markers (attitudes, motives, etc.).

Two levels of marking correspond to two sociolinguistic hypotheses formulated in Chapter Two: nondirectional hypothesis corresponds to level 1 marking (stating ethnicity markers in speech of the groups, without predicting the closeness of any group towards the target language speech as represented by Group 3). The directional hypothesis predicts a more native-like production in the case of Group 2, i.e. the group characterised by smaller distance towards the target language speech community and integrative motivation (see Chapter Two), and corresponds to the marking at level 2.

The following use of particular phonetic parameters in the implementation of voicing and vowel duration can be claimed to mark Group 1 and 2 at individual levels:

- level 1:
 - closure duration and VOT use in phonetic implementation of voice phonetic vowel duration;
- level 2:
 - voice implementation strategy
 - phonetic vowel duration for short vowels.

The acquisition of the phonological system in the case of second language users comprises temporal relationships between phonetic parameters marking phonological categories and their phonetic implementation. The acquisition of phonological contrasts new in second language: vowel duration and aspiration, presupposes the phonetic implementation of categories making use of these contrasts on the phonetic level, i.e. phonetic vowel duration and the use of aspiration in voice implementation. The results of experiments 2 and 3 support that claim: phonological vowel duration and aspiration have been found significantly marked in speech production of Group 1 and Group 2 subjects. Consequently, the discussion of phonetic implementation strategies presupposes the existence of phonological categories corresponding to the phonetic ones.

The importance of the phonological conditioning in the use of temporal parameters in phonetic implementation supports the need for an integrated framework for the study of the acquisition and usage of non-native speech. In the case of a second language study, it is in the comparison between the sound systems of the two languages that we look for possible candidates

for markers in the second language speech, predicting difficulties in the case of “new” vs. “similar” phones or categories in the second language (see Flege 1995, 1997).

Second language speech production can be studied on the basis of individual speakers or groups of speakers. The first solution enables the researcher to control most parameters, but makes it impossible to draw any generalisations as to the socio-psychological conditioning present in the speech, i.e. any findings based on one subject need to be verified against other subjects, which inevitably leads to the need for group comparisons. In light of the above, the problem of uncontrolled variables inherent in group studies seems inevitable whichever path we choose: the only solution seems to lie in an attempt to control as many variables as possible. Thus the criticism of ‘naive sociolinguistics’ as formulated by Dressler and Moosmuler (1991) can be refuted on the basis of careful experiment planning on the one hand, and accounting for the socio-psychological differences obtaining within groups as accurately as possible on the other. Finding subjects for group experiments is not an easy task, and naturally the similarities between subjects in one group tend to be stressed; although the differences cannot be ignored, it is the pattern resulting from the shared factors that is investigated.

The motivation for group studies of the type presented in this book, i.e. a sociolinguistic methodology applied to the second language speech production, is based on the belief that there are numerous factors determining second language acquisition, many of which are closely related to the attitude formation. The attitude formation is a process related to such factors as beliefs, education, ambition, personality, and history-shaped experience. It is the last feature which is a clear-cut division line in deciding about group membership in the case of immigrant second language speakers.

However, although the discussion of social and affective factors may seem restricted in application to the immigrant situation, some aspects of acculturation are closely related to the second learner situation in a native country. The study of socio-psychological variable effect on the use of individual phonetic parameters based on the data elicited from immigrant bilinguals living in the second language natural setting is hoped to provide important clues for the discussion of markers in second language speech in

all contexts. Once proved to exist in second language speech, these markers can be expected to be used by all speakers with the same linguistic background. Consequently, the recognition of phonetic parameters functioning as markers can be used not only for research purposes, but also in the second language teaching practice.

This study shows that a number of phonological categories are implemented in a marked way in the second language English speech by the native speakers of Polish – they include voicing, aspiration and vowel duration. The implementation of the above phonological categories in English involves the use of the following temporal phonetic parameters: Voice Onset Time, closure duration and vowel duration. The experimental results point to the use of all three parameters as markers in Polish accented English; however, the degree to which individual parameters mark the speech of Polish subjects varies.

A major distinction to be made at this point concerns the difference between ethnicity markers present in the speech of both groups, but differing in the degree to which they are present in particular contexts in individual groups, and ‘attitude’ markers, i.e. social and affective markers present in the speech of one group or the other: these markers may correspond to different strategies of a category implementation.

The source of all markers investigated in the present study can be found in language differences and the resulting negative transfer. However, some of these markers seem to mark the speech of both Polish groups when compared to the English native speaker group, while others are used differently by the members of individual groups. In the present study, phonetic vowel duration, the VOT and closure duration have all been found to function as type 1, ethnicity markers; however, besides phonological vowel duration, the VOT and closure duration are claimed to function as type 2, ‘attitude’ markers in the implementation of a group-related strategy of voice implementation: Group 1 tends to rely on closure duration, Group 2 on the VOT, i.e. Group 2 chooses a more native-like strategy in voice implementation across contexts.

Before drawing final conclusions, let us concentrate on similarities and differences between the two experimental groups against the native speaker, control group. As the experiments reported in Chapter 3 checked

two types of the hypotheses, the sociolinguistic hypotheses concerning the relationship between two experimental groups, and phonological hypotheses concerning phonetic implementation strategies. Experimentally verified sociolinguistic hypothesis has been divided into two hypotheses, labelled non-directional and directional in Chapter 2, and corresponding to two types of markers predicted in the speech data. Type 1, ethnicity markers, have been expected to be present in the data elicited from both experimental groups: their presence is assumed to differentiate all Polish native speakers from the English native speakers in a significant way, marking a Polish accent in English. Thus a non-directional relationship in the data is assumed: when testing the use of a given parameter by individual groups, we do not predict which of them is expected to “score higher”, i.e. use more native-like pattern. The parameters which fail to reach statistical significance between the Polish groups, but reach the level of significance in the comparison between any Polish group with the English group, are claimed to function as level 1 markers.

The results of experimental procedure suggest that the following parameters function as type 1 – ethnicity markers in Polish English:

1. Voice Onset Time in [t] implementation (aspiration):
 - (a) both Polish groups use significantly shorter VOT values in post-pausal initial implementation of [t] (T 1.1.1-1.1.3),
 - (b) both Polish groups use significantly shorter VOT values in word-medial intervocalic implementation of [t] (T 1.2.4-1.2.6),
2. Closure duration: both groups tend to use longer closure duration in implementation of [t] and [d] in initial position in running speech (T 1.4.4-1.4.7., 1.4.10-1.4.12).
3. Phonetic vowel duration: although both groups tend to use vowel duration as a cue for voicing, the general tendency is to use vowel durations closer to the “norm” group in the case of short vowels than long vowels (T 3.2.8-3.2.25); in all cases, however, the ratio of vowel duration is much lower for the Polish groups than for the English group (A 3.2.1-3.2.2, T 3.2.2-3.2.3.).

A different function is assigned to these phonetic parameters which are used differently by each experimental group: their use is believed to signal

group-related values and attitudes. The following parameters are suggested to be dependent on group attitudes, i.e. to function as type 2 markers:

1. Voice implementation strategy: Group 1 tends to rely on closure duration rather than on VOT, while Group 2 is much closer to Group 3 in the use of shorter closure durations and longer VOT values, especially for [t] (T 1.2.5-1.2.6, 1.2.10-1.2.12, 1.3.3-1.3.4, 1.3.8, 1.4.3-1.4.4.).
2. Phonological vowel duration: although both groups manage to implement phonological vowel duration, short vowels tend to be much longer in Group 1 than Group 3: Group 2 is closer to the “norm” group (T 3.1.17, 3.1.18., 3.1.22-3.1.26.).

The conclusions reached on the basis of sociolinguistic phonetic experiments enable us to single out some temporal parameters of English phonetic implementation which have a marking function in the second language English production of the native speakers of Polish. The marking function of these parameters is claimed on the basis of a production study; an evaluation study performed on the native speakers on English would be a natural continuation of the experimental procedure reported here.

The importance of studies aiming at clear definition of phonetic correlates of perceived foreignness and perceived strength of foreign accent in a given language lies basically in their relevance to the pedagogy of foreign/second language teaching, both in a natural context and in a classroom situation. However, although evaluation studies are able to provide clues as to the native speakers' reaction to individual foreign accent markers in nonnative speech, or even enable the rating of these markers (e.g. Cunningham-Andersson and Engstrand, 1989), the evaluation study seems especially useful as a continuation of a production study. Only in a production study are we able to distinguish particular parameters in a precise way, as elements of a linguistic system of the speakers.

From the functional perspective, the present study offers a number of insights into the marking of Polish accent in English; moreover, as two types of markers have been distinguished, the information as to the tendencies more likely to result in a successful, i.e. closer to the target language, English production can be established.

The strategy which tends to be employed in the phonetic implementation of consonant voicing by all native speakers of Polish in English in-

volves problems with the implementation of a phonetic category {voiceless aspirated}; however, the tendency to rely on Voice Onset Time rather than closure duration in context-sensitive voice implementation results in an implementation strategy closer to the native one.

In the case of vowels, while phonetic vowel duration, i.e. context-dependent lengthening/shortening, does not reach the level of native durational differences, the phonological duration enters into the relationship: it is in the case of short vowels that Polish native speakers are closer to the target norm. A possible explanation of the above fact can be offered on the basis of predicted areas of difficulty for second language speakers.

Polish native speakers do not use phonological nor phonetic vowel length distinction in their native language; in English, however, they produce more native-like durational differences in the case of short vowels, which are produced without an exaggerated duration. Thus, the difficulty connected with the production of phonologically long vowels “overrides” phonetic vowel duration, i.e. the speakers need to acquire the phonological duration first, before they are able to produce phonetic vowel duration in the case of a less natural class of phones classified as ‘new’ in the second language. Consequently, it is the class of short vowels of English which would be expected to be easier for the native speakers of Polish; however, the results of Experiment 3 provide evidence to the contrary. The production of short vowel durations is not necessarily easier for all speakers, functioning as a type 2 marker, i.e. it proves to be dependent on the distance from the target community, with the Group 2 speakers more successful in target-like value production. A general tendency in Group 1, on the other hand, seems to be to produce short vowels with a significantly longer vowel duration than the target, “norm” duration. Thus the predictions made on the basis of the contrastive approach to the two systems need to be verified against the production data in controlled contexts. It is only when we observe the dynamism of the speech production by different speakers that conclusions as to the expected level of difficulty can be drawn. In the case of phonetic vowel length it is the problem with sufficient shortening rather than lengthening that proves to be a major problem in the use of vowel duration.

The interaction between two types of markers in the Polish accent of English requires further studies, as the predictions as to the stable features of a Polish accent in English and the dynamism of their change in relation to the level of proficiency and the distance from the target community combined will make it possible not only to describe the accented but also formulate the most effective ways of controlling the degree of this accent if the learners feel motivated to do so. Thus functional perspective on the phonetic experimental research can result in uncovering numerous phonetic parameters of great importance to the second language learners and teachers. The acquisition of the second language phonology and phonetics requires practice and effort. The knowledge of individual phonetic parameter function in the second language speech can bring us much closer to the understanding of basic implementation strategies employed by second language speakers and of conditioning the implementation strategy choice. Only when we uncover phonetic implementation regularities for second language speakers can we hope to help them improve their second language production.

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