

# **Bridging research on phonetic descriptions with knowledge from teaching practice – The case of prosody in non-native speech**

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## **1. Introduction**

The phenomenon of “non-native prosody” is of interest for a variety of groups and has been seen from different perspectives and used for different purposes. These groups include foreign language teachers, teachers of these teachers, authors of learning materials, researchers, and engineers facing the problem of non-native input for automatic speech recognizers.

Broadly speaking, we can divide the professional groups concerned with non-native prosody into two categories: linguists who carry out research on language data, and teachers who give language classes. Both groups have in common that they deal with real data and not simply hypothetical concepts of non-native prosody. As a simplification, one could claim that the former group considers non-native prosody in theory, and the latter group is concerned with non-native prosody in practice.

The aim of this article is to show the interests and methods of both groups, to ask for common and/or distinct interests, to uncover parallels but also differences, to describe the exchange between the two groups and to show the limitations and the benefits of a “bi-lateral” exchange of insights and knowledge. In section 2, the interests and methods of the theoretical and the practical groups are presented and the current state of the exchange between these two approaches to non-native prosody is described. Section 3 illustrates the potential for exchange with examples from the area of stress, articulation rate, speech rhythm and intonation. In the last section, we will point out requirements and solutions for the mutual benefit of both groups.

## **2. Theoretical and practical approaches to non-native prosody**

The aim of theoretical research in the area of second language (L2) prosody, as in linguistics as a whole, is to develop descriptions in the form of models and theories with predictive power. Those models and theories are based on and tested by empirical research, that is on observations and measurements of non-native speech, and are modified according to these observations. A rich choice of research methods exists which vary along the lines of the type of language data that is analysed (experimental data or spontaneous data) and the analysis method (e.g. qualitative versus quantitative; auditory or instrumental). Typically, speech elicited from non-native speakers in closely controlled conditions is analysed instrumentally (see Barry, this volume, Gut, this volume, Jilka, this volume, Mennen, this volume, van Dommelen, this volume). Based on these data, generalizations are made and formulated in models and theories of non-native prosody. Fundamental research of this type can have two main foci: a synchronic or a developmental focus. In the former, non-native prosody at one stage is described, whereas in the latter the aim is to find common developmental paths or stages in the acquisition process of language learners. Findings by theoretical researchers are disseminated in publications and conference presentations on both the national and international level, whereby “international” is often restricted to English.

The aim of language teachers is to enable language learners to produce and perceive the prosody of the target language to an adequate extent, depending on the learner’s needs. This might range from minimal communicative abilities to a near-native language competence. Teachers have a wide range of methods available, including imparting theoretical knowledge, raising awareness for language structures, practical production exercises and perceptual training. Again depending on the learner’s expectations and requirements, teachers pick a combination of these methods. Typically, language teachers learned these methods in their teacher-training courses and modify and extend their repertoire with increasing teaching experience. Occasionally, teachers are encouraged to participate in further training programmes.

The two groups have different expectations and conceptions about “the other side”. Some researchers are interested in seeing their findings applied in language teaching and describe implications for teaching. They envisage the application of theoretical findings in second language research to language teaching as a top-down process, with a direct link between research-

derived theory and classroom practice. Language teachers, conversely, wish to be provided with relevant teaching materials and methodologies. Both sides express dissatisfaction with each other, as reported by several authors (van Els and de Bot 1987:153, Ellis 1997). Often, the findings of empirical research are not clear and uncontested enough to provide a straightforward guideline for teachers. Moreover, the results of empirical research are rarely disseminated or presented in a way that is meaningful and immediately accessible to language teachers. In addition, the interests of researchers do not necessarily focus on areas that are considered most conspicuous and important by teachers. Lastly, the question remains whether there is a “best method” to teach L2 prosody. Due to the constantly varying nature of the classroom, teachers, based on their experience and knowledge, apply pedagogical methods flexibly, depending on the changing dynamics of the learner community and classroom context.

The relationship between the two groups concerned with non-native prosody is and always has been difficult. Researchers do rarely go to language classes and teachers do rarely go to scientific conferences. An exchange between the two poles “theoretical research” and “language class” is highly desirable but there are no institutionalised platforms for the various professional groups concerned with L2 prosody to meet. At least one intermediate group of professionals can be identified: the writers of language text books and developers of teaching materials. Ideally, they form a bridge between theoretical research and language teaching by selecting findings and (re-)formulating them in a way to make them accessible to both language teachers and language learners and by developing appropriate learning materials. This means that they have to be simultaneously able to interpret and assess the relevance of the theoretical research and be aware of the requirements of language teachers. Moreover, they need to be able to transform theoretical findings into suitable exercises and come up with interesting examples. Unfortunately, very few people with these qualifications exist. In the commercial sector, language material is developed under time and financial pressure so that, in reality, a thorough sifting of the numerous publications and conference proceedings in the area of non-native prosody is not possible.

However, even if there were sufficient professionals qualified to bridge the gap between theory and practice, in many cases they would fail because of the lack of overlap in interests between the two groups. Whereas language teachers are concerned with the acquisition of non-native prosody, researchers focus mainly on the description of individual stages. In most a-

reas of L2 prosody research, a myriad of competing theories and models dealing with fine-grained details exist which predict very different acquisition processes and attribute different degrees of importance to particular pedagogical strategies and learner characteristics. It is the purpose of this article to describe this gap using the problem areas of non-native stress, articulation rate, speech rhythm and intonation as examples. Furthermore, the present volume as a whole constitutes a step towards bridging the gap between theory and practice in L2 prosody and to describe ways of achieving a mutual interchange beneficial to both sides.

### 3. Theoretical-practical exchange in L2 prosody

In the following sections, we will trace the gap between theoretical researchers and language teachers with the examples of non-native stress, articulation rate, speech rhythm and intonation and show where improvement in the exchange and mutual benefits are possible.

#### 3.1. Stress

##### *“Stress“ in theory*

Stress and accent, which give prominence to a syllable in a word or a word in a phrase, have been identified by many theoreticians as well as practitioners as important prosodic concepts (e.g. Fox 2001; see also Mehlhorn this volume, Missaglia, this volume, Hirschfeld and Trouvain, this volume). However, the terms “stress” and “accent” are used in contradictory ways among researchers (cf. Grice and Baumann, this volume). Sometimes, “stress” is defined as an abstract category, the prominence of a word represented in the speaker’s mental lexicon, and “accent” as its observable, phonetic realization in actual speech (e.g. Jassem and Gibbon 1980). Others use the terms with exactly the opposite meaning (e.g. Laver 1994). We use the term “stress” here in the first sense, i.e. stress as a *potential* accent, and we reserve “accent” for the *realized* “stress” (resulting in perceived prominence) when a word is produced in an utterance. Moreover, theoretical research in the areas of stress and accent is not only characterized by terminological debates but has also generated controversies on the subjects of the appropriate mode of their description, their phonetic correlates as well as their phonological role in specific languages.

There are languages that are said not to have word stress as an abstract phonological category at all, for example Japanese (Beckman 1986). Other languages have been divided into those that have obligatory word stress and those without. Word stress can be relatively unpredictable or fixed. In the case of fixed stress, all words of a language have stress on a particular position, e.g. the last syllable (for example Turkish) or the penultimate syllable (for example Welsh). In languages with low predictability in their word stress (for example German and English), a set of phonological rules is usually needed to describe the stress patterns of words. Yet, little consensus has been reached on the appropriate description of word stress rules in these languages, and the competing proposals are typically based on abstract theoretical models that are not accessible to the uninitiated reader (e.g. Hayes 1984, Wiese 1996, Gamon 1996, Pater 2000).

In addition, the term stress has been applied to two domains of phonological description: word-stress, which is a phonological property of the word, and sentence-stress, where stress is seen as a differentiating property of the utterance. In the second domain, a distinction between stress and intonation is difficult to uphold (e.g. Kingdon 1939) as the relationship between accents and pitch is very intricate. In intonation languages such as English and German, pitch is anchored to accents (see also section 3.4). Other languages differ with respect to whether “pitch” or “stress” is assumed to have precedence. In Swedish, for example, lexically stressed syllables have additional tonal information (van der Hulst and Smith 1988), whereas in Japanese, the presence of tone alone is assumed to determine the position of the prominent syllables (Abe 1998).

The above-mentioned differences in terminology used to capture the prosodic differences between languages stem in part from the fact that the phonetic realization of accents can be different in different languages. In languages with “dynamic accent” such as English or German, the phonetic parameters pitch, length, loudness and articulatory precision are combined with different relative importance for the phonetic realization of stress (cf. Cruttenden 1997). In both English and German, the difference between stressed and unstressed syllables is correlated with differences in duration together with a different vowel quality, differences in pitch height and loudness. In “pitch-accent” languages (i.e. languages in which lexical words can have a distinctive tonal form) such as Swedish or Norwegian, phonetically different types of tones or pitch patterns are used to prosodically differentiate words (Gårding 1998).

*“Stress” in practice*

Numerous publications have shown that non-native speakers do not always produce stress on words and in sentences in a native-like manner (e.g. Backman 1979, Juffs 1990, Grosser 1997). Some authors even report “stress deafness” (Dupoux, Pallier, Sebastian and Mehler 1997): Speakers of French, a language without stress differentiation at the word level are deaf to lexical stress that Spanish speakers perceive. This “stress deafness” could affect the learning of stress-related phenomena in foreign languages. Moreover, no matter whether a researcher studies speech signals of non-native speakers or a teacher is confronted with the oral performance of language learners in the classroom, the evidence is the same: non-native speakers of some languages have more difficulties with stress and accentuation than non-natives of other languages. This is the case whether or not the L1 and L2 involved both have word stress. Learners of English, whose native language has different word stress rules, for example, show different strategies in producing word stress and sentence stress patterns in their L2 (Archibald 1995). What is more, incorrect stress patterns often persist despite long exposure to correct forms. Thus it would appear that “stress deafness” is not merely the result of stress *typology* differences (as between French and Spanish).

This dependency of the teaching of stress rules on the native and target languages involved requires a variety of didactic approaches. Target languages without word stress or with fixed word stress require different teaching methods than languages with unpredictable stress. When the stress systems of native and target language coincide, stress does not need to be taught at all, though attention to particular “faux amis” must not be neglected (e.g. Spanish and Italian “teLEfono” versus English and German “TElephon(e)”). In all other cases, current teaching methods typically focus on the creation of language awareness (see Mehlhorn, this volume and Wrembel, this volume). This is achieved by a combination of perceptual and articulatory training and knowledge input (see also Hirschfeld and Trouvain, this volume). Language awareness is also assumed to enhance the acquisition of further foreign languages. For example, it has been proposed that a native speaker of Polish who has learned in English as a first foreign language that the penultimate stress pattern of his or her native language cannot be transferred to the L2 has created phonological awareness of the importance of word stress and will increase his or her sensitivity for word stress rules in further foreign languages. Thus in the acquisition of a further lan-

guage he or she will profit from general phonological awareness developed in the acquisition of another language, even though the two languages (of course) have different phonological systems. Naturally, the creation of language awareness presupposes a reliable phonological description of the stress rules of a particular language.

Besides the phonological awareness for predicting the *position* of word stress a phonetic awareness is needed for the *realisation* of stressed syllables in contrast to unstressed syllables. It may be that the target language and mother tongue differ in how stress is realised with a mix of duration, pitch, intensity and articulatory precision.

### 3.2. Articulation rate

#### *"Articulation rate" in theory*

Listeners perceive their native language/s and those they speak with a high level of proficiency as less fast than those languages they have a poor command of or do not know at all. Abercrombie (1967: 96) puts it as follows: "Everyone who starts learning a foreign language, incidentally, has the impression that its native speakers use an exceptionally rapid tempo." Though languages may differ in terms of rate of speech production – depending of course on speech mode and what unit is selected for measurement (including or excluding pauses, spontaneous speech or reading passage style) – there certainly appear to be differences in the way speech rate is perceived across languages. Some authors explain the false impression that an unknown language sounds faster than normal (i.e. than one's own language) with phonological differences such as different patterns of syllabic complexity (Osser and Peng 1964).

Articulation rate plays a significant role for learners of a foreign language, not only in speech comprehension but also in speech production. It is usually taken as a correlate of a speaker's general language proficiency or fluency and is conceptualized to correlate with the fluidity, continuity, automaticity or smoothness of oral speech production. Rate of speech has been measured in many ways (cf. Trouvain 2004). This also applies in the context of language learning: Lennon (1990) measures speed rate both with words per minute unpruned and words per minute after pruning, where pruning refers to the exclusion of all repeated and self-corrected words as well as asides, i.e. comments on the narrative task itself. Towell (2002) measures the number of syllables per minute and Cucchiari, Strik and

Boves (2000, 2002) measure the number of phonemes per time unit. In addition, the mean length of a “run” has been analysed where a “run” is defined as a stretch of speech between pauses (e.g. Lennon 1990, Towell 2002, Cucchiariini, Strik and Boves 2000, 2002, Freed, Segalowitz and Dewey 2004) with some researchers including filled pauses in “runs” and others not. Since a run is defined by its delimitation by pauses of a certain length, it does not necessarily represent a semantic or syntactic unit in speech. A syntactically-based chunking of speech is proposed by Lennon (1990) with the “t-unit”, which he defines as one main clause and all subordinate clauses. He measures the frequency and length of pauses within “t-units”, the percentage of “t-units” followed by a pause as well as the percentage and mean length of pauses at “t-unit” boundaries. The ratio between pauses and speech in recordings is referred to as the phonation/time ratio (Towell 2002, Cucchiariini, Strik and Boves 2000, 2002) and is measured by dividing the total duration of speech by the total duration of the recording. Finally, the amount of speech can be measured either in the total number of words produced (e.g. Freed, Segalowitz and Dewey 2004) or in the duration of speaking time per total recording time. This measurement can obviously only be used when the analysed recordings of the different speakers have a comparable length.

Experimental studies have shown that some of these quantitative measurements of articulation rate correlate with native speaker’s judgements of fluency (Lennon 1990, Cucchiariini, Strik and Boves 2000, 2002). However, it was further found that articulation rate is not constant in natural speech (Miller, Grosjean and Lomanto 1984). Even in reading passages, the articulation rate may be adjusted (by competent readers) by giving more time to sections with greater communicative weight and less time to those that are less important to the “message”. Rate *variation* is therefore an important concept. Hand in hand with this, of course, go all the other segmental and prosodic modifications that are associated with local temporal changes (often referred to as “local speech rate”) resulting from information weighting – from lexical stress position to function-word or particle destressing and topic and focal accenting (see e.g. Eefting 1991).

### *“Articulation rate” in practice*

In language teaching and testing, articulation rate, or speed of delivery in an L2 is taken as an important diagnostic feature. Articulation rate which also reflects the level of fluency of a non-native speaker is highly correlated



with the level of proficiency evaluated by native listeners (Gut 2003). When grading oral examinations, teachers are often asked to score candidates for fluency and even in standardized testing procedures such as exams taken by the Deutscher Akademischer Austauschdienst or the British Council, candidates have to be allocated to bands with descriptions such as “fluent, virtually error free” or “not fully fluent with occasional inappropriate use of structures”.

Despite this central importance of a native-like speech rate in an L2, very few didactic methods for its acquisition seem to have been developed for language teaching. A common conviction seems to be that an increase in articulation rate merely constitutes a quasi-automatically acquired feature of the language learner’s generally improving linguistic competence. Missaglia (this volume) describes some exercises that raise the learners’ awareness of stylistic variants and the concomitant segmental and prosodic feature changes that are associated with speech rate changes. Yet, so far, there are almost no attempts to include speech-rate *variation* in the teaching strategy. This is valid for varying the *global rate* of the same utterances in audio material as well as for more varied *local rate* changes in different text sorts. On the comprehension side, didactic methods focussing on articulation rate could include examples of different, situationally defined stylistic variants of key expressions (cf. for German “Phonetik Simsalabim” by Hirschfeld and Reinke 1998).

### 3.3. Speech rhythm

#### *“Speech rhythm” in theory*

“Speech rhythm” is a concept that has been the subject of intensive discussion and empirical investigation over many decades. In early theoretical approaches it was described as a periodic and relatively isochronous recurrence of events such as syllables in the case of the so-called “syllable-timed” languages, and feet in the case of the so-called “stress-timed” languages (Pike 1945, Abercrombie 1967). In syllable-timed languages such as French, syllables were assumed to be similar in length. Stress-timed languages, to which English was counted, in contrast, were supposed to have isochronous, i.e. regular, recurring stress beats. Since in those languages the number of syllables between two stress beats varies, they are adjusted to fit into the stress interval – hence syllable length is reported to be very variable in stress-timed languages. No convincing acoustic basis for

either isochrony of feet in stress-timed languages or equal length of syllables in syllable-timed languages has ever been found (e.g. Classé 1939, Uldall 1971, Fauré, Hirst and Cafcouloff 1980, Roach 1982, Dauer 1983).

More recent approaches of measuring speech rhythm are based on the assumption that speech rhythm is a multidimensional concept which includes various phonological properties of languages. Accordingly, languages are no longer classified into discrete rhythmic classes but are assumed to be located along a continuum, though the continuum is still generally described in terms of its “syllable-timed” and “stress-timed” extremes. Dauer (1983), for example, suggested that rhythmic differences between languages are the result of phonological, phonetic, lexical, and syntactic facts such as variety of syllable structures, phonological vowel length distinctions, absence/presence of vowel reduction and lexical stress. Since syllables increase in length when segments are added and closed syllables are longer than open ones, speech rhythm measured in terms of syllable-duration differences reflects the syllable complexity distribution. So languages without complex syllables tend to have more equal syllabic durations than those with strongly varying complexity. Equally, overall differences in “rhythm” between languages reflect whether a language has vowel reduction or not; those classified as stress-timed do, though it may or may not be coded as a phonological alternation as it is in English, Danish or Portuguese. Many languages classified as syllable-timed either do not have lexical stress or accent is realized by variations in pitch contour. Conversely, stress-timed languages realize word level stress by a combination of length, pitch, loudness and quality changes, which result in clearly discernible beats, at least in deliberate or stylized production.

On the basis of this approach several phonetic measurements of “speech rhythm” have been proposed. Ramus, Nespors and Mehler (1999) segment speech into vocalic and consonantal parts and calculate the proportion of the vocalic intervals of a sentence and the standard deviation of the vocal and consonantal intervals. Other measurements focus on local relations. Grabe and Low (2002) measure the difference in duration between successive vowel durations and between successive consonantal intervals. Gibbon and Gut (2001) calculate the ratio of adjacent syllable and vowel durations. These studies have succeeded in describing differences between languages (Ramus, Nespors and Mehler 1999, Grabe and Low 2002, Gut and Milde 2002) as well as between varieties of one language (Low and Grabe 1995, Gut and Milde 2002). Critics of these parametrisations, however, point out that speech rhythm is located on a higher phonological level than segments

and that it consist of a coupling between intervals at a lower prosodic level with those at a higher level (Cummins 2002). Dauer (1983) and Barry (this volume) even suggest dispensing with the concept of “speech rhythm” altogether and recognizing that it is used merely as a cover term for a range of structural properties of a language.

### *“Speech rhythm” in practice*

The concept of “rhythm” that a theoretically unburdened language teacher (or language learner) has is probably very different from the complex definition underlying the studies mentioned in the previous section. The traditional view of a syllable-timed or stress-timed distinction lies closer to the intuitively more plausible concept of rhythm as a regular beat. This brings together music and poetry, supporting the idea of utterances in different languages potentially differing in their inherent rhythm. However, even the most competent of teachers needs to understand the factors which underlie the differences between a “rhythmically correct” and an “incorrect” rendering of an utterance she/he is offering for practice. Typology statements reflect tendencies, but teaching requires concrete utterances which encapsulate the critical features that distinguish the L2 rhythmic type from the L1 type. Though these may be easy enough to find among the communicatively useful expressions that language course books introduce, the repetitive production that is essential in order to guarantee the sense of rhythmicity may be easier in some learner groups than others. Finally, the acquisition of rhythmic sensitivity must extend to an awareness of “utterance rhythm” as the product of “word sequence” x “context”, by varying the context in which a particular expression is practised.

## 3.4. Intonation

### *“Intonation” in theory*

The term “intonation” is used in theoretical research with different scopes. In a broad definition, the term covers both linguistic and paralinguistic features such as tempo, voice quality and loudness which signal the emotional state of the speaker (cf. Fox 2001). Less broad definitions include only linguistic phenomena produced with the prosodic features tone, stress and quantity and their physiological correlates fundamental frequency, intensity, duration and spectral characteristics. The narrowest definitions of into-

nation are restricted to only postlexical phonological phenomena thus excluding word stress, tone and quantity (Ladd 1996, Hirst and di Cristo 1998).

Currently, two major competing models of intonational structure are in use for the description of intonation, based on a number of fundamentally different assumptions about intonational structure and using different conventions of intonational transcription (see also Grice and Baumann, this volume). The contour-based approaches on the one hand take pitch movements or contours as the basis of intonational analysis. Intonational analysis in this approach is mainly carried out auditorily. Intonation is represented in detailed interlinear transcriptions which depict the properties of each syllable in terms of accentedness, pitch height and pitch movement. The autosegmental-metrical approach, on the other hand, proposes that intonation consists of sequences of minimally two and maximally three different tone levels. These tones can be realized as pitch accents, usually aligned with accented syllables, or have a delimitative function as initial or final tones of intonational phrases. Intonational analysis in this approach relies on a combination of computer-assisted instrumental and auditory techniques.

Cross-linguistic descriptions of the intonational system of languages are still few and far between (e.g. Delattre 1965, Fox 1981, Willems 1982, Grabe 1998, Hirst and di Cristo 1998, Jun 2005). For individual languages, tone inventories and the meaning of particular pitch movements or tone combinations have been proposed (e.g. Grice, Baumann and Benz Müller 2005 for German, and Pierrehumbert and Hirschberg (1990) for American English). In these descriptions, however, the authors stress that a specific tone or pitch contour does not have an abstract meaning but may rather be associated with a specific pragmatic meaning in given contexts. As yet, very few empirical studies exist that systematically investigate the intonation of non-native speech (but see Mennen, this volume, on pitch alignment and pitch range, and Jilka, this volume, on tone inventory), but native language influences have been variously described (e.g. van Els and de Bot 1987).

### *“Intonation” in practice*

Despite the relatively uncontroversial theoretical side of intonation, the teaching of intonation still plays a minor role in the L2 classroom. This might be due to the fact that both teachers and learners of a foreign language still underestimate the consequences which deviant intonational pat-

terns may have in communicative and attitudinal respects. The use of visualization techniques that enable learners to perceive differences between their own and a native speaker's rendition of utterances with the help of computers that display the respective intonation curves is often still impeded by the technical requirements in classrooms and the lack of suitable software tools (but see Herry and Hirst 2002 for a successful attempt).

As for the teaching of stress rules, the creation of language awareness (see Mehlhorn, this volume) and perceptual sensitization (see Wrembel, this volume) seems to constitute a prerequisite for the production of native-like intonation by language learners. In the approach suggested by Misaglia (this volume), in contrast, the acquisition of intonation is pictured as an unconscious by-product of teaching methods that focus on larger prosodic units and imitative techniques.

#### **4. Research and practice – mutual stimulation?**

In the preceding sections we illustrated the gap that exists between theoretical research on L2 prosody, on the one hand, and teaching practice in language classes on the other. In this summary we would like to suggest answers to the question how research and practice can benefit from each other. In particular we will discuss how research results can provide the source for course book materials for language teachers, and how we picture the possible impact from state-of-the-art teaching practice on theoretical researchers.

“Research and Development” should ideally comprise a double orientation – theory and application – and a continuum of activity which allows the practical implementation of the theoretical results. In the case of language teaching at the applicational end of the activity continuum, theoretical research questions can be directed towards contrastive aspects of language structure and speech patterns, as we have illustrated in this paper. Equally valid theoretical poles from which to derive applicational answers are, on the one hand, research into learning psychology and patterns of language-learning behaviour (cf. Flege and Hillenbrand 1984, Flege 1995, Strange 2002 and, on the other, research into didactics and language-teaching methodology. A comprehensive theoretical grounding of language-teaching materials clearly demands a breadth and depth of theoretical research knowledge that would go beyond anything that can be expected of anyone actively involved in teaching.

Is it illusory, then, to expect the practical exploitation of theoretical research into prosody? When the results of research consist of theoretical descriptive models, the answer is probably “Yes”. But if the descriptive models provide contrastive information about different languages, they offer a theoretically solid basis for course book authors and teachers to focus exercises on, in whichever didactic and methodological framework they subscribe to. The contrastive work done within the structuralist linguistic framework during the 1950's and 1960's on the syntax, morphology and segmental phonology of various languages is an example of how theoretical work can become established as the basis for developing practical teaching materials (e.g. Moulton 1962, Kufner 1971). However, it also illustrates the problems inherent in theory which did not take the reality of the learning/teaching situation into consideration. Contrasting phoneme inventories ignores allophonic or other phonetic differences (e.g. vowel-quality differences) that may lie behind identical phonetic symbols. The potential of research results for practical application, therefore, depends on their being formulated in a way which is relevant to the learner's task and understandable for the teacher.

In general, however, the direct application of research findings in the classroom must be regarded with reserve. Rather, we have shown with the examples discussed in section 3 that an intermediate step is necessary. The relevance of research findings can only be investigated in studies on actual language teaching. It is those research results that offer possibilities of direct application in other classroom situations. Yet, scientific studies on foreign language classroom practices are rare to find. This is especially lamentable because we believe that these kinds of investigations provide the essential link between theory and teaching practice in L2 prosody. Furthermore, they present the opportunity for research to benefit from state-of-the-art language teaching. For example, a possible focus could be whether the prosodic concepts of stress, intonation, speech rhythm and so forth employed in teaching are the same as the theoretical concepts proposed in research. Discrepancies can spark off new directions for research. Likewise, scientific results gathered on teaching prosody to non-native speakers with different native languages can be beneficial for research. Technological advances have brought the acquisition of speech produced *in situ* and its post-production processing and analysis within the reach of even small research teams and made non-intrusive collaboration between teachers and researchers a genuine possibility.

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## **Part 1. Phonetic descriptions**

