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**Perception of Stress in English Noun-noun  
Compounds by Czech Learners**

(Bakalářská práce)

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**Perception of Stress in English Noun-noun Compounds by Czech Learners**  
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*Abstract in English:* The purpose of this thesis is to explore the perception and the awareness of English stress of Czech learners, specifically in English noun-noun compounds. The thesis is divided into two parts. The first part of this thesis serves as a theoretical background. The second part includes my study. I used two methods in my experiment. The first method was a perception test conducted in the classed of phonetics and phonology. The second part of my experiment was a stress placement test that was based on participants' intuition. Three types of words were tested, compounds stressed on the first constituent, compounds stressed of the second constituent and polysyllabic words. From results of 25 participants of both tests it is visible that the most difficult stress pattern for Czech learners is in the compounds stressed on the second constituent.

*Key words in English:* compounds, noun-noun compounds, stress, perception of foreign stress, Czech, English

*Abstract in Czech:* Cílem této práce je prozkoumat percepce přízvuku a intuitivní umístění přízvuku českých studentů angličtiny, konkrétně přízvuku u složených slov z podstatných jmen. Práce je rozdělena na dvě části. První část je teoretická. Druhá část obsahuje popis metody, průběhu a výsledků pokusu, který sestává ze dvou částí: části percepční a části, kde účastníci umísťovali přízvuk podle vlastní intuice. Byly testovány tři typy slov: mnohoslabičná slova, kompozita s přízvukem na prvním slově a kompozita s přízvukem na druhém slově. Výsledky 25 účastníků obou částí pokusu ukazují, že největší obtíže mají čeští posluchači s kompozity s přízvukem na druhém slově.

*Key words in Czech:* compounds, noun-noun compounds, stress, perception of foreign stress, Czech, English

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# 1 Introduction

The main purpose of this study is to explore the perception of English lexical stress by Czech learners of English as a foreign language and test their intuition about placement of stress in English. More specifically, stress in English noun-noun compounds, so called compound stress.

Stress is a very natural feature of speech. As Peter Ladefoged (2011, 250) explains stressed sounds require greater muscular energy, involve pushing more air out of lungs and are characterized by increased pitch, loudness and duration. The resulting stressed syllable seems to be more prominent to a listener than the unstressed one. In spite of the fact that stress is undeniably an important suprasegmental feature of the language, Czech learners do not pay enough attention to this area when learning English. This may be caused by the fact that in most text books of English there is not enough exercises targeted to stress and from my own experience teachers do not practice in classes this suprasegmental feature of English sufficiently. As Judy Gilbert (2008, 1) points out, there is not enough time in classes to give attention to this aspect of speech and when there is the emphasis is usually put on native-like pronunciation of consonants and vowels only.

Czech is so called syllable-timed language, in which syllables tend to recur at regular intervals of time. Moreover, almost every time stress falls on the first syllable of the word, no matter the number of syllables (Ladefoged 2011, 249). This cannot be claimed about English, this typologically distinct language belongs to the class of stress-timed languages and is characterised by variable stress patterns that can even differentiate meaning of words. A listener can easily recognize that a word '*record*' with a stress on the first syllable is a noun, but *re*'*cord*' stressed on the second syllable refers to a verb. Stress in English occurs at roughly equal timing intervals so the speaker can tap the rhythmic beats of most of utterances. It was also said that the ideal or optimal rhythmic structure is one in which syllables alternate *strong-weak-strong-weak*. They seem to make the speech more easily decoded. Such optimal rhythmic structures are also referred to as *eurhythmic* structures (Carr 1999, 107). The rhythmicity has consequences for longer words, which typically have more than one stress.

In English, compounding is a highly productive process of creating new words and so the vocabulary is enriched by expressions such as *boarding school*, *apple pie* or *coffee cup*. Kingdon (1965) called this kind of compound English-type Compound and defined it as “ a semantic unit that has attained dictionary status, composed of two or more words written separately, joined by a hyphen, or as one word, and whose meaning may or may not be straightforward combination of the meanings of its components” (1965, viii). It still has not been resolved what the rule for stress placement in such expressions is. Majority of noun-noun compounds is generally classified as receiving stress on the first constituent. Nevertheless, these expressions can be stressed on either the first or on the second constituent. The reason why this topic appears very interesting to me is that there is more than one criterion that needs to be taken into account when dealing with noun-noun compounds. One linguist who continues to argue about this problem is Giegerich, who distinguishes between complement-head and attribute-head compound as well as between fore-stress and end-stress. He states that “complement-head NNs are fore-stressed and originate in the lexicon while attribute-head NNs typically have end-stress and syntactic provenance” (2004, 1). This division will be further discussed in this work.

Because the terminology concerning stress differs considerably, the first part of my work will be dedicated to the theoretical background of this topic and the terminology. I will try to provide a literature review of all the sources I used, including criteria for distinguishing between phrase and compound, dividing the noun-noun compounds into sections and comparing different studies. In the second part I will report a study of the ability of Czech learners to hear stress and to place the lexical stress in English noun-noun compounds. Generally, native speakers are able to say how many syllables a word has and which syllable is the stressed one (Carr 1999, 87). My experiment examines perceptual capabilities of non-native speakers. The experiment was carried out with a group of students of English at the Department of English and American Studies at the Palacký University. Participants were asked to mark the stress in polysyllabic words and noun-noun compounds presented in isolation, in other words in expressions, which are not embedded in a sentence. The results were then compared with *Longman Pronunciation Dictionary* (2008) and English native speakers and rated. The question I am asking is whether the Czech learners are able to hear the stress

in English NN compounds and then to examine their intuition about the placement of the stress. Another question is whether they are more accurate at compounds that are stressed on the first constituent of the compound, as they were taught in morphology classes and as their L1 suggests.

## **1.1 Structure**

The structure of my thesis is as follows. The chapter called Theoretical background covers topics of compounding, stress systems in Czech and English and Criteria for compounds. The subsequent chapter briefly outlines the studies that inspired me to write my thesis about this topic; and my study with methods and procedure of both perception test and stress placement test. Subchapter 3.2.4 summarises the results of both conducted parts of the experiment. The penultimate chapter is Discussion with suggestion for further exploration and the last chapter is Conclusion.

## **2 Theoretical background**

This chapter will serve as a theoretical background of my thesis. I will try to provide the literature review of all the sources I consulted, integrate different textbooks and introduce individual theories. Since this thesis is concerned with the stress pattern of compound nouns, it would be suitable to pay attention to the process of formation of such expressions. The subchapter concerned with Compounding is mostly based on Huddleston and Pullum's *A Students Introduction to English Grammar* (2005).

### **2.1 Compounding**

Because we live in a time of technological change, many new words giving names to new inventions need to be created. One way how to create a new expression is to incorporate it into English from other languages. Apart from neologisms, loan words, abbreviations and conversion there is the most productive process called Composition. Depending on the forms that are composed into new word we differentiate between - derivation which attaches a derivational affix to a base and so creates a word of new part of speech; and compounding, "which forms a complex base from a combination of smaller bases – almost always two"

(Huddleston and Pullum 2005, 283). These two processes are the most productive ways how to enrich English vocabulary.

Consequently we can say that every compound consists of more than one basis.

Since compound nouns are the largest category of compounds many problems arise here. When two bases combine to form a new expression one has to differentiate whether it is a morphological compound that is spelled together as for example *greenhouse* or *newspaper*, or whether the new expression is syntactic construction like for example *green house* or *quality paper* (Huddleston and Pullum 2002, 1644).

Moreover, such expressions can be divided according to the class of resultant compound. Resultant compounds may be of various parts of speech. For example adjectives *heart breaking*, *snow-white* or *stress-free* and verbs like *hand wash*, *sleepwalk* or *baby-sit*. Nevertheless, compound nouns such as *birdcage* constitute by far the largest and most varied category (2005, 283) and they are the expressions that are of my interest in this thesis.

This fusion of at least two bases takes place on two levels: semantic and formal. Unlike idioms that are fused above all semantically and so the meaning is usually opaque, in case of compounds the fusion takes place mainly on formal level. Nevertheless, there are so called true compounds which are fused on both levels (Veselovská 2009, 35).

### ***2.1.1 Headedness of Compounds***

Compounds can be divided into groups according to their headedness: Endocentric compounds, or in other words, those compounds that have a head; and Exocentric compounds, compounds lacking any formal head (Bauer 1983, 30).

There have been many proposals concerning the notion of headedness. In traditional grammar the term “head” served for linguists’ intuition about the most important part of a phrase, its central element or nucleus and consequently was defined semantically. More theoretically inclined linguists wanted to couple this notion with some kind of formal behaviour of the element in the question and as a result, certain morphosyntactic tests came to be used. Unfortunately, these approaches in some cases showed different results, in other words, found different

heads. Another type of test was pronominalization, but also failed to provide conclusive evidence of the head (Keizer 2010, 9).

“Thus the choice more or less remains between the rather vague, but intuitively appealing, semantic approach and more systematic, but also more abstract and semantically less revealing, formal approach” (Keizer 2010, 9). General structural characteristics of phrases reveal that in nearly every phrase one element is obligatory; this element may function as an equivalent of the whole construction. In every noun phrase there is a central constituent or a head, to which other constituents can be added (Quirk et al 1985, 61). This phenomenon is briefly explored in the following section.

## **2.1.2 Semantics**

### **2.1.2.1 Hyponymy of Compounds**

Great number of compounds especially noun compounds are hyponymic. The whole compound is a hyponym of its base that functions as a head. “We say that noun X is a hyponym of noun Y when X denotes a subset of what is denoted by Y. This relation may hold between morphologically unrelated words” (Huddleston and Pullum 2002, 1645). As they further explain for example a *bulldog* has a *bull* dependent, *dog* as the head and denotes a kind of dog. *This is a bulldog* entails *This is a dog*. But the reverse entailment is not working because *This is a dog* does not entail *This is a bulldog*.

According to Huddleston and Pullum to be hyponymic is a default case for a compound but there are cases when the compound is not a hyponym of the head. For variety of reasons a number of compounds fail the entailment test for hyponymy.

The term *hotshot* does not denote any kind of shot, but a person who is really skilled in some field. Its non-hyponymic property is simply a matter of lexicalisation. *Redskin* is another example of lexicalisation. It shows the pattern of compounding but it lacks hyponymic properties. Its literal meaning gives a property to the whole entity which is denoted by the compound. A *redskin* is not kind of skin but a kind of person who has red skin (2002, 1645).

### **2.1.3 Syntax**

Expected behaviour of phrasal N+Ns would be productivity as in any syntactic construction. Failure in productivity would make it lexical. Standard distinction

among the dependents of a head is between complement and modifier. In case of pre-head dependents of a noun in a syntactic construction, it must be modifier (attribute) (Giegerich 2004, 4).

### **2.1.3.1 Subordinative vs. Coordinative compounds**

A vast majority of compounds can be classified as subordinative; it means that one base can be regarded as the head and the other as the dependent. According to *Right Hand Head Rule* the head is usually the right member, the second element of the compound.

As a good example these two compounds can serve: *birdcage* and *cage-bird*. A *birdcage* denotes a kind of cage that serves for keeping bird; while a *cage-bird* denotes a kind of bird that is usually kept in a cage. Even though these compounds consist of exactly the same words in both cases the head of the compound is different. It is said that every time the first element of the compound is dependent on the second one (Huddleston and Pullum 2002, 1646).

Unlike subordinative compounds, coordinative compounds do not include one member that is dependent and the other that serves as a head. They consist of bases that are of equal status. *Secretary-Treasurer* is one of the examples of coordinative compounds. *Secretary- Treasurer* is someone who is both secretary and treasurer; it is not a kind of treasurer. Neither of the components is dependent on the other (2002, 1646).

## **2.2 Compound nouns**

Since compound nouns are the biggest group of any compounds, many linguists were concerned with categorisation of such expressions. Because this group offers the biggest variety, Huddleston and Pullum (2002, 1646) divided them into two classes: *noun centred* and *verb centred*. This division is based on formal heads of compounds, in other words on those elements on which the meaning of the whole compound is based. As opposed to Huddleston and Pullum's morphological categorisation Roger Kingdon (1964) divided these compound nouns into four sections based more on the form of noun that composes the construction. Besides, following division into subcategories will be supplemented by Bauer's (1983) comments.

Kingdon distinguishes double-stressed and single-stressed NN compounds. "In double-stressed compounds the first component takes a full stress, and the

kinetic stress falls on the second component” (1964, 147). The kinetic stress ‘’ is associated with kinetic tone, it is “a tone in which the pitch of the voice varies during the whole duration of the tone” and only secondary stress can occur after the kinetic stress (1964, ix). Nevertheless, no other textbooks use this term. In single-stressed compounds the second component can be entirely without stress or with partial stress (1964, 147).

### **2.2.1 Noun-centred**

#### **2.2.1.1 Both components are ordinary nouns**

As Kingdon found out, this category embraces 55% of all compounds and 88% of all these expressions is single stressed. Nevertheless, this group consists of very large number of double stressed expressions like collocations and nonce collocations because they have not been lexicalised yet. Among these double stressed expressions Kingdon states those where the first member names a material or an article used for manufacture, if it names something made out of or containing. In this case, the compound is double stressed like *'rock`salt*, *'peach`brandy*. In most double stressed cases the first constituent is an attribute of the second one (1964, 150). It is interesting how the sources differ, in *Longman Pronunciation Dictionary* there is only single-stressed *'rock salt*, not even having secondary stress.

Compounds with other meaning relationships are single stressed e.g. *'rock,plant* or *'peach,stone*.

Ascriptive compounds would also belong into this group. Relation between the first and the second noun is comparable to the relation between ascriptive modifier and the head noun. The example *manservant* shows similar features with coordinative compounds, nonetheless, we treat them as subordinative in a sense that the components are of unlike types. Very common expressions like *girlfriend* or *manservant* are called appositional compounds, but *manservant* stands out because the plural is marked on both components- *menservants* (Huddleston and Pullum 2002, 1648).

In almost all cases of noun-centred compounds the first element is a dependent and the final one a head. A *footpath* is a kind of path designed for people who are on foot. In other words these compounds are mostly hyponymic.

Nevertheless, there are some lexicalised forms of NN compounds that are non-hyponymic: a *shoe-tree* which is not a kind of tree neither *ladybird* a kind of bird.

### **2.2.1.2 Dvandva**

Among noun-centred compounds coordinative ones like *murder-suicide* also belong, as they were already mentioned above. Nevertheless, there are also so called dvandva compounds. This term is taken from Sanskrit grammar and denotes only a minor category. They refer mostly to proper nouns and denotes a union of referents either territorial *Bosnia-Herzegovina* or businesses *Hewlett-Packart*. Coordinative compounds differ from dvandva compounds in a sense that the components exist individually as well as jointly. *He is a murder-suicide* denotes *he is a murder* and *he is a suicide*. But you can't say *I bought it from Hewlett* and *I bought it from Packart*.

### **2.2.1.3 Compounds with an ·s at the end of the first element**

Following subtype of NN compounds is aptly called by Huddleston and Pullum "Compounds with an ·s at the end of the first element". ·s in a *bullseye* derives from a genitive; the typical genitive apostrophe is dropped unless the word is written with a hyphen *bull's-eye*. "The orthographic convention of writing these elements together reflects the stress pattern, which in turn reflects lexicalisation"(2002, 1649). Single-stressed expressions like '*Ladie's man*, '*spokesman* belong to very common compounds unlike for example double stressed '*fool's parsley* (Kingdon 1965, 155).

Another base for compounds with ·s is plural – like in plural-only noun *clothes peg*, or in nouns where no longer carries any plural meaning like *headsman*. As Kingdon states, in some cases it is difficult to draw the distinction between plural –s and possessive –s (1965, 154).

### **2.2.1.4 Bahuvrihi**

Another term taken from Sanskrit grammars is Bahuvrihi compounds. This term originally mean "having much rice" and the constructions of this type are adjective+ noun or noun + noun. Example of the latter group is *birdman* or *egghead*. There is not large number of such compounds in English. Nevertheless, this type of construction is still productive. They usually denote kinds of people

(animals, plants) and are generally derogatory (Huddleston and Pullum 2002, 1649).

### **2.2.2 Verb-centred**

The second large group of compounds is that with verbal central element. The form of such element can be either identical with that of the lexical base like in *handshake*, or derived from the lexical base by suffixation like *theatre-goer* or *blood-poisoning*. The relation between two elements is comparable to the relation between a verb and NPs in clause structure. For these expressions glosses like “a kind of” are not fitting because they would create pragmatically unnatural expressions (Huddleston and Pullum 2002, 1652).

#### **2.2.2.1 Noun + Nomen Agentis**

When the second component is a noun formed from a verb by the addition of *-er* or *-or* suffix and it names the doer of the action, the stress rules seem to be clear. When the first component is an object of the action, the compound is single stressed: *'housekeeper*, *'school,teacher*, *'gold,digger* (Kingdon 1965, 152).

With the suffix *-er* attached to the verbal element the compound usually denotes a person or thing. A *'live-saver* denotes *somebody who saves lives*; *clothes-drier* is a *machine that dries clothes*. Nonetheless, there are also cases where the noun corresponds to the object of preposition like in *'freedom-fighter* that denotes *somebody who fights for freedom*.

However, the first constituent does not have to be necessarily an object of the action denoted by *nomen agentis*. In these cases the compound is double-stressed. A *'town `crier* cries not a town, but news. Or *'vacuum `cleaner* does not clean the vacuum but other things by means of partial vacuum. (Kingdon 1965, 153)

#### **2.2.2.2 Noun + Gerund**

Another suffix which can be added to verb and so change its part of speech is *-ing* suffix. According to Kingdon (1964) 88% of all Noun + Gerund compounds are single stressed, if the first component has a predicative function towards the gerund: *'blood poisoning*, *'fly-fishing*. The resulting compound can be perceived as either adjective or noun.

When the first constituent has an attributive function, the compound is double-stressed e.g. *'thanks `giving*, *'lead`poisoning*. According to Preference poll of *Longman Pronunciation Dictionary* in 71 % the stress is *'thanks `giving* and only 29% *'thanksgiving* in American English.

## **2.3 Stress**

One of the features that can help us differentiate phrase and compound is its stress. Furthermore, according to Quirk and other linguists stress is the decisive factor in differentiating between compound (stress on the first element) and phrase (stress on the second constituent) since the semantics does not indicate clear boundary (1985, 1332).

Together with length, tone and intonation, stress is one of the suprasegmental features of speech. As Peter Ladefoged states suprasegmental features are “those aspects of speech that involve more than single consonants or vowels” (2011, 249).

### **2.3.1 Stress in Czech**

As MacCarthy states “the only satisfactory course for the foreigner to adopt is to learn the stressing of each word individually”(1967, 157).

Because the correct position of stress differs in separate languages, vast majority of Czech learners of English occasionally fights with the correct placement of stress. In Czech the stress seems to be highly predictable. It usually falls on the first syllable of the word with the exception of monosyllabic preposition adjoined to the word. In this case the stress is moved to the preposition that is usually unstressed (Dušková 1994, 16). Or in case of more monosyllabic words in a sequence, the words are usually joined together and only the first one bears the stress (Palková 1994, 282). Because of its fixed character, the stress in Czech is not phonologically active; it means that it cannot differentiate meaning of two words like in English. For listeners its delimitative function is crucial, which is in other words the quality of stress to signal the word boundary. Nevertheless, this statement cannot be taken as absolute. In connected speech it could but does not have to be expressed (1994, 277).

Word stress is usually understood as prominence of one syllable in comparison to other syllables. The basis of stress is its contrast not an absolute acoustic quality. As Palková states word stress is a complex phenomenon which

implies that prominence consists of various acoustic cues like intensity, fundamental frequency and its duration (1994, 277-279).

Since the duration in Czech is phonologically functional, it creates word paradigms (*vila* vs. *vila*) greater duration can be taken as a signal of stress only to limited extent (1994, 279). This lengthening of stressed vowels is present only in languages without phonologically active vowels. Because Czech is not such language, vowels are not prolonged; nevertheless, this phenomenon occasionally appears at consonants of stressed syllable. (Hála 1962, 298)

As discussed in the literature concerned with L2 acquisition “L2 learners exhibit effects of interference from the native language” (Carpenter 2010, 355). That can be one of the reasons why Czech speakers of English may sound strangely, because they use Czech stress pattern. Another factor why Czech speakers may sound non-native-like is because “the difference in prominence between stressed and unstressed syllable is greater in English than in many languages. This applies equally to word stress and to sentence stress” (Kingdon 1959, 160) and so Czech-accented English may sound more monotonous.

### **2.3.2 Stress in English**

One of the reasons why Czech learners of English find it hard to sound native-like could be also the stress, since this suprasegmental feature is more complicated in English than in Czech. “There is no fixed place for strong stress in English words. In the majority of cases no rules can be formulated, and even when they can, they are generally subject to numerous exceptions” (MacCarthy 1967, 157).

When studying English stress system, learner should pay attention to the form of the explored word. According to Elisabeth O. Selkirk (1984, 18) “there are discernible regularities in the occurrence of stressed and unstressed syllables, as well as regularities in the location of primary stress”.

There are some tendencies that could help the learner; one of them is for example presence of suffixes. Inflectional suffixes like adjectival *-y*, adverbial *-ly*, or *-er* or *-ish* leave the stress on the stem unchanged. Suffix can also take the stress itself for example suffix *-ation*. And suffixes like *-ate* or *-ity* move the stress on the stem (Cruttenden 2001, 235).

In phonetic terms, the sound is produced with greater muscular energy and greater burst of air out of lungs.

On the acoustic side, this burst of energy results in sounds with greater loudness, increased duration and in a change of pitch (Giegerich 2001, 179); consequently the hearer should be able to identify the stressed syllable. Nevertheless, it appears to be a difficult task to identify which syllable is the most prominent, as it is visible from many studies mine included.

In Ladefoged's *A Course in Phonetics* the author explains that for the listeners the most reliable cue for recognising stressed syllable is the length. The vowel in stressed syllable is usually longer than it would be in an unstressed one (2011, 93). Apart from length, stressed syllable seems to be louder and usually, but not always, has higher pitch. This claim, however, was not supported by Plag. According to him, the most reliable cues are in fact pitch and duration, but duration only when involves minimal pairs (Plag 2006, 150).

Monosyllabic words are usually unstressed in both languages, English and Czech, with the exception of emphatic speech e. g. *It's 'on the table not 'under the table.*

Since English is usually described as stressed-timed language, stressed syllables tend to recur at regular intervals. Of course, the intervals are not always equal but it is true that there is a tendency to maintain the rhythm in English. The rhythm can be maintained by moving the stress on different syllable or by deletion of stress. Intervals between stresses are affected by both the number of syllables and the type of vowels and consonants within the syllable (Ladefoged 2011, 118).

When it comes to the placement of stress one can be confused as well. Native speakers learn the correct placement of stress naturally while language learning during childhood. The rules, we, as non-native speakers, have to try to learn, native speaker of English does not feel as rules of his own language because he has acquired it unconsciously (Quirk 1985, 13). All English Philology students have to learn so called linguistic rules but there are some areas with certain "fuzziness, semi-regularity and irregularity; and one of the area where this semi-regularity is pervasive but has not yet received an explanation is stress assignment in English noun-noun compounds" (Plag 2006, 143-144).

### **2.3.2.1 Different kinds of stress**

When dealing with stress we have to differentiate between Word stress and Sentence stress. As Roger Kingdon in his *The Groundwork of English Stress*

states “word stress is the relative degree of force used in pronouncing the different syllables of a word of more than one syllable” (1964, 1). He also states that word stress can be of three types:

1. Primary, Strong, Main or Principal;
2. Secondary, Half Strong or Medium;
3. Weak or Unstressed (1964, 1).

Nevertheless, majority of textbooks differentiate only main/primary stress and minor/secondary stress.

In words like *pho'nology* one stress, main stress in this case, is adequate. But in other polysyllabic words there seems to be more than one more prominent syllable. As in *phono'logical* prominence of syllables is further differentiated. The secondary stress is weaker than primary (main) stress but stronger than prominence of unstressed syllables (Giegerich 2001, 179).

In the terminology concerning stress textbooks differ a lot, no uniform terminology is being used and different textbooks use different terms. For example *Gimson's Pronunciation of English* does not use the term ‘stress’ at all. According to Cruttenden (2012, 25), this word has been used in phonetics and in linguistics in ambiguous ways, and so he rather uses a word ‘accent’ as referring to syllables that stand out of the utterance. Also what one textbook calls word stress is in another textbook lexical stress; and what is for some authors prosodic stress is usually called sentence stress.

The other stress, above mentioned sentence stress which is “the relative degree of force given to the various words in a sentence or utterance” (Kingdon, 1964, ix) will not be of my interest in this thesis.

As Cruttenden explains English stress is fixed in a sense that the main stress always falls on the particular syllable but is free in a sense that you can't predict where it falls (2008, 235). We can say that stress is, to some extent, phonemic feature of language because speaker has no difficulty with finding noun-verb pairs that differ only in the stress placement like for example *'pervert* being a noun and *per'vert* being a verb. “Every (lexical) word – noun, verb, adjective or adverb - has a stressed syllable, and where more than one syllable bears stress, one of these stresses will be the main stress, and the others subordinated” (Giegerich 2001, 179). This contouring can be observed on cases where several words are put together in a larger linguistic unit either syntactic phrase or compound word.

Thus, in the noun phrase ,*black* 'bird the main stress is put on the second element, while in the compound noun 'black,bird the stress is on the first one (2001, 251).

Since the topic of my thesis goes beyond the word level as the linguistic units, which are of my interest are larger than words, even though semantically serve as one word expressions, they will be in so called *citation form*. Undoubtedly, it is idealised form, differing significantly from connected speech but it is essential for “establishment of (segmental) phonemic contrasts as well as for the statements of generalisations regarding syllabification and stress” (Giegerich 2001, 249).

### **2.3.2.1.1 Phrasal Stress**

The noun phrase ,*black* 'bird can serve us as a good example. When two words constitute any kind of syntactic phrase, in this case a noun phrase, the second one bears the main stress and the first one a minor stress. Given examples follow the same contouring: ,*heavy* 'metal, ,*scientific* 'investigations and thus are examples of syntactic phrases. Consequently, we could say that the unmarked stress pattern in these constructions is one of final stress. Of course, there are some cases when the stress pattern changes, for example contrasting or putting emphasis: 'heavy ,metal (rather than light metal) (Giegerich 2001, 253).

*Phrasal Prominence Rule:* In a pair of sister nodes [N<sub>1</sub> N<sub>2</sub>]<sub>P</sub>, where P is a phrasal category, N<sub>2</sub> is strong (2001, 253).

### **2.3.2.1.2 Compound stress**

“The conditions under which the different stress patterns are adopted are by no means wholly clear, but are connected with the degree to which a sequence is ‘institutionalized’ as a lexical item, *ie* a compound” (Quirk 1985, 1330).

Unlike in the syntactic phrases, the main stress in the compound words falls on the first element of the compound. All these examples have non-phrasal stress pattern and thus are perceived as compounds: 'blackbird, 'greenhouse, 'textbook, 'courtroom, 'watchmaker. The situation becomes more complicated when it comes to compounds with more members like for example three-member compounds 'blackboard ,eraser or 'greenhouse ,effect. The interpretation of four-member compounds and more can be ambiguous. “A *car maintenance training course* is most likely to be interpreted as a training course for car maintenance

but might possibly be read as a course on car maintenance training” (Giegerich 2001, 255).

The prominence pattern in these constructions seems to be more complex than in phrases. “But the fact that these patterns fall into groups, clearly determined by internal syntactic structure, suggests the possibility of generalisations:

*Compound Prominence/Stress Rule:* In a pair of sister nodes  $[N_1N_2]_L$ , where L is a lexical category,  $N_2$  is strong if it branches above the word level” (2001, 256).

Giegerich also mentions that this rule seems to be in accordance with the prominence pattern within morphologically simple words,

*Word Prominence Rule:* In a pair of sister nodes  $[N_1N_2]_L$ , where L is a lexical word,  $N_2$  is strong if:

- a. It branches above the syllable level, or
- b. L is an exceptional noun, or
- c. L is a verb (2001, 204)

As Ingo Plag (2009) noticed, even though *Compound Stress Rule* (Chomsky & Halle 1968, 17) (*CSR*) clearly makes correct predictions applicable to a large number of nominal compounds there are more than few exceptions. Here are some examples that do not follow the generalisation of *CSR*. These examples follow *Phrasal Prominence Stress* instead and phonologically behave like phrases: *pork* 'pie, *school* 'dinner, *London* 'Road or *Christmas* 'pudding. However, it is not possible to determine which compounds are governed by *Compound Prominence Rule* and which behave like phrases. In purely syntactic terms it is often hard to draw the distinction between compound and phrase. Nevertheless, it is obvious that prominence pattern itself is not a sufficient indicator for distinguishing between compound and phrase (Giegerich, 2001, 258).

If that were so, *London* 'Road would be a syntactic phrase while 'London, Street a compound. And, *Christmas* 'pudding would be a phrase and 'Christmas cake a compound. This categorisation would be hardly justifiable on syntactic grounds. (2001, 258)

## 2.4 Criteria for compounds

Linguists seem to be in agreement with criteria according to which it should be possible to decide whether a given NN construct is a phrase or a compound. These five criteria are briefly described in following subchapter, orthographic criterion being given bigger attention.

### 2.4.1 Orthography

Different criteria need to be taken into account when defining compounds. These criteria are language specific, for every language distinct criteria are important. For Czech language, the orthography seems to be crucial. Compounds in Czech are mostly spelled together (*šedomodrý*) or with a hyphen (*anglo-americký*) (Dušková 1994, 19).

English is in terms of orthography less consistent. Compound words can be spelled together, with a hyphen or completely separately. However, one can encounter all three options of great number of compounds. As a supporting example of this claim we may consider *Table 1*. As a source of the data in following *Table 1* and *Table 2* I used *British National Corpus*.

Tokens	BNC frequency	%
Courtroom	185	83,71
Court room	24	10, 86
Court-room	12	5, 43
<b>TOTAL</b>	221	100

*Table 1:* Frequency of spelling variants of “*courtroom*” in BNC

“The hyphen is used when a compound has been newly created or is not widely used; when a compound has gained a certain currency or permanency, it is often spelled closed up, without hyphen”(Akamjian et al.2010, 36). Orthography is one of the criteria as most English compound words are spelled together. (Dušková 1994, 19) This statement was supported by Carr and other linguists, according to them the substantial factor in deciding, whether the unit is a compound or not, is its orthography. It is suggested that '*greenhouse* or '*gentleman* can be perceived as simple words, and so the stress is on the first. Similarly, the phrase *green*

'house denotes any house that is green and so its meaning is composed of the meanings of his parts (Carr 1999, 96).

As a counterargument of the above mentioned statement, *town 'hall* can serve. Even though the meaning of this unit is specialised, syntactically does not behave like phrase, the stress is put on the second constituent. As it is visible from *Table 2*, according to the distribution in *British National Corpus*, it also fails the orthographic criterion.

<b>Tokens</b>	<b>BNC frequency</b>	<b>%</b>
Town hall	269	98, 18
Town-hall	4	1, 46
Townhall	1	0, 36
<b>TOTAL</b>	274	100

*Table 2:* Frequency of spelling variants of “*town hall*” in BNC

#### **2.4.2 Syntax**

It is not easy to distinguish between a noun phrase and a compound noun. Expected behaviour of phrasal N+Ns would be productivity as in any syntactic construction. Failure in productivity would make it lexical. Standard distinction among the dependents of a head is between complement and modifier. In case of pre-head dependents of a noun in a syntactic construction, it must be modifier (attribute) (Giegerich 2004, 4). We could classify an NN construction as a phrase if after *pro-one operation* the expression is still grammatical. Hence, *wooden 'bridge* is a phrase, since an expression *a wooden bridge and a steel one* is perfectly grammatical (Giegerich, 2009, 11).

#### **2.4.3 Phonetics**

By some linguists it was said that stress criterion is the crucial one, as some compounds and phrases differ only in stress. Others argue whether stress should be seen as a criterion at all. This discussion was lead mostly with reference to noun + noun compounds (Bauer 1983, 102), upon which this thesis is centred. Nevertheless, this criterion does not seem to be sufficient in differentiating English compounds.

Many generalisations were formulated during studying English NN constructions. As it was approved, majority of compounds is stressed on the first element while most phrases are stressed phrase-finally. This statement is in accordance with *Nuclear Stress Rule* as well as *Compound Stress Rule* (Chomsky & Halle 1968, 17). In some cases, this difference is the only one that can be seen. Nevertheless, what was also discovered is the difference in length of separate forms; phrasal form e.g. *black 'board* being in most cases longer than the corresponding compound e.g. *'blackboard* (Plag 2006, 144).

#### **2.4.4 Morphology**

The way in which words are made up of morphemes in other words its morphology “plays a major part in the regularities that govern stress placement in English” (Giegerich 2001, 190). It is said that inflectional morpheme e.g. plural –s is attached to the whole compound, it means after the last member *baby boy - baby boys*. Nevertheless, there are certain groups of compounds for example appositional compounds that exhibit the plural forms on both members e.g. *manservant-menservants* (Bauer 1983, 203).

#### **2.4.5 Semantics**

According to Bauer (2006, 271), specialized meaning is required, it is sometimes also mark of lexicalisation, but it does not come with frequent use.

Once an NN construction is perceived as a compound, another semantic classification is needed, as occasionally, certain semantic pattern demands specific stress pattern, as in *cherry 'brandy* or *olive 'oil*. Both these compounds denotes a semantic pattern of AB, where A is a material from which B was made out of. (Bauer 1983, 108)

### **2.5 Variety generalisations**

Apart from numerous exceptional forms that do not follow any of regularly accepted stress rules, Plag pointed out that “there is cross-varietal variation (e.g. British English vs. American English), which makes it even harder to systematically investigate this type of semi-regularity” (2006, 144).

Stress assignments vary considerably according to the variety of English. These differences between British and American English make it even harder to systematically investigate this field. For this reason it is important to determine

the variety in which the study is carried out (Plag 2006, 144). In the case of Plag's study (2006), the group consisted of native speakers of American English.

RP: *Shop* 'steward, *stage* 'manager, 'season ticket

GA: 'shop steward, 'stage manager, season 'ticket

(Cruttenden 2001, 229)

As it is visible on the above given examples and other compounds, primary stress (in *Gimson's Pronunciation of English* a term 'accent' is used instead) in NN compounds in majority of cases shifts from final position in RP into initial position in GA (2001, 232). Also Scottish English favours end-stress in some expressions like *avocado* 'oil or *corn* 'oil, while for non-Scottish speakers the only end-stresses *oil* would be the *olive* 'oil. And even this compound has stress alternations. Nevertheless, there is no fixed rule for any dialect or variety of English that could determine the distribution of stresses in NN constructions. (Giegerich 2009, 9)

Ingo Plag in 2006 carried out an experimental study with a group of native speakers of American English, in which stress patterns of existing as well as non-existing NN compounds were acoustically measured. "The results show that there is indeed a surprising amount of variation in stress assignment even within one variety of English" (145). The assumption that speakers of one variety are consistent in their stress assignments could be wrong. As it is visible from many studies, mine included, and relevant literature (Bauer 1983) native speakers are far from consistent. Moreover, there is a visible difference in stress pattern within one speaker's results.

## 2.6 Research questions

The study is asking two questions. The first question is how accurately advanced Czech learners of English can perceive stress placement in noun-noun compounds. The second question is how accurate are their intuitions about stress placement in these compounds. In dependence on what they were taught in morphology classes, frequency of the compounds with stress on the first constituent in comparison to the frequency of the end-stressed compounds and also because of the influence of their L1, I presuppose that participants of my experiment will have better results at expressions with stress on the first syllable,

in case of NNs on the first syllable of the first constituent. I expect this result in both parts of experiments, in perception test as well as in the intuition test.

### 3 Studies

Because studies of English NN constructions have not brought satisfactory results yet, English noun-noun compounds still attract attention of various linguists. This chapter contains original study by Ingo Plag (2006) and some observations by Heinz J. Giegerich (2004). Studies of above mentioned linguists inspired me and gave me the idea of this thesis. Nevertheless, this thesis is not a replication of their studies, since Plag's research was led with native speakers and it was focused on completely different criteria of NN compounds, more specifically structural, semantic and analogical factor.

#### 3.1 Original studies

Plag's experiment was carried out with a group of nine native speakers of American English, three of them male, and six of them female. He tested the productivity of stress with stimuli being non-existing compounds as well as lexicalisation with stimuli being existing compounds. One specific field he wanted to explore was the authorship relation within NN compounds. Items in this subset consisted of modifier-head expressions only. In other part of the experiment the subset contained 25 existing compounds which were either argument-head or modifier-head.

This approach to so called structural hypothesis was proposed by Giegerich (2004). The hypothesis is based on the fact that in English syntax, complements follow the head. So, the construction like *'truck driver* where complement precedes head cannot be taken as a syntactic phrase, thus it must be compound and hence is left-stressed. And on the other hand the word order in modifier-head constructions like *steel 'bridge* corresponds to syntactic modifier-head phrase, hence are syntactic phrases and so they are regularly right-stressed (Plag 2006, 145-146).

Of course, there are aberrant cases when the stressing is different like *'table cloth*. Such cases are according to Giegerich result of lexicalisation. This explanation would bring a prediction that because lexicalised constructions are

left-stressed, “novel modifier-head compounds should generally receive rightward stress” (Giegerich 2004, 146).

The participants of Plag’s experiment were asked to read sentences containing randomized stimuli. “Potential sequencing effect was controlled for by presenting the sequences in two different orders”. (2006, 149)

The participants were asked to put the stress either on the first or on the second element of the given NN construction. It turned out, however, that it was very difficult task for them, because the constructions were embedded into a sentence, not being isolated. As Gussenhoven and others state things become simpler when given stimuli are isolated and results are obtained for every stimulus separately (2004, 3).

Another problem was that the raters occasionally were not able to express their judgements and so the number of results was lower. A more objective method with measuring of pitch differences was used instead. “One can assume that if the pitch difference is positive, the item is left-stressed (*'opera glasses* F0= +73.46Hz), and if the difference is negative the item is right-stressed (*morning 'paper* F0= - 40.23Hz)” (Plag 2006, 151). Nevertheless, this approach was not proved at every compound.

Also, one of the problems Plag had to face was the effect of sentence intonation. NN constructs appeared in clause-initial, clause-medial, and clause-final position. Quite expectedly, the pitch values steadily decreased from initial to final position. Also the results differ in dependence on sex of the participants. “In this sample women mark stress with more pronounced pitch differences and higher intensity ratios better than men do” (156).

Even though the experiment was carried out with a group of American native speakers, the frequencies of the compounds were checked in *British National Corpus*. Nevertheless, as Plag suggests there is no reason to suspect significant differences in frequencies of compounds used in American English and British English (160).

The result of the study brought interesting conclusion. The structural relation could play its role. Every argument-head relation compound was according to native speakers left-stressed. The problem appeared with modifier-head compounds, as the stress pattern varies from left to right. Apparently, the

structural hypothesis proposed by Giegerich (2004) cannot explain stress patterns in NN constructions.

## **3.2 My study**

My experiment consists of two parts. The first part involves a perception experiment. The second part was meant to explore learners' intuition about different stress patterns in NN compounds that are of frequent use. My prediction was that Czech learners of English will prefer stress on the first constituent of the NN compound.

### ***3.2.1 Method***

#### ***3.2.1.1 Participants***

The participants were all students of English at Palacký University. All of participating students have achieved approximately C1 knowledge of English language and certain knowledge of phonetics, syntax as well as morphology. The two parts of the experiment were carried out in two weeks during 3 different classes concerned with phonetics and phonology. However, the conditions were the same for all of them. Although the two parts of the experiment were administered during the same class, it was not possible to ensure that all participants took part in both. Data from the participants who took part only in one test were excluded. As a result 25 participants were included in the study.

##### ***3.2.1.1.1 Baseline data***

Because controlling data only with dictionary is not sufficient, three native speakers of English were asked to take part in my experiment, two participants being male, one being female. Two of them were native speakers of American English and one of British English. Both male native speakers are frequently exposed to Czech, as they currently live in the Czech Republic.

##### ***3.2.1.2 Stimulus set***

Unlike tests with native speakers carried out by Plag (2006), the stimulus set of NN constructions that I created consists only of existing compounds. My aim was to use compounds that participants must have encountered during the time of learning English, and they use them with bigger or smaller frequency.

In order to find NNs occurring with sufficient frequency, I searched *British National Corpus* and selected only those constructions that had relatively high frequency. Even though some compounds (*baby carriage*) appeared in *BNC* with rather low frequency I included them, because their meaning is familiar to learners.

Most of the compounds appeared in *British National Corpus* in more than one orthographic form; nevertheless, the frequencies of the chosen compounds correspond to their separate spelling only. For example the token *teacup* spelled together appears in the *BNC* 96 times but *tea cup* spelled separately with the frequency only 30. NN constructs spelled together or hyphenated were deliberately eliminated, because their orthography suggests stressing on the first syllable, while separate spelling allows both kinds of stress pattern.

The stress patterns of all the results were then checked and compared with *Longman Pronunciation Dictionary* (2008).

In order to create the stimulus material of NN compounds and polysyllabic words I used audio from *LPD* (2008), sounds were recorded in *Audacity computer program* (version 2.0.6). This procedure guaranteed that all sounds (NN constructions as well as polysyllabic words) that were played to the group of participants were pronounced with the correct stress pattern and correct pronunciation by native speakers. All the recordings were then saved as WAV files. The intensity of all the stimuli was scaled to the same level.

Total number of compounds was 40, 20 of them were compounds with stress on the first member and 20 compounds with stress on the second element. Moreover, 40 derived words were used as distractors. All stimuli were two-, three- but maximum four-syllable expressions, compounds as well as derived words.

Stress pattern in given expressions differ. The stress falls on the first, second or third syllable in derived words, in compounds also on the fourth. Distribution of stress in all 80 expressions is given in *Table 3*.

The list of NNs consists of 36 compounds with general meaning and 4 compounds being proper names. These four compounds were used in order to explore the awareness of Czech advanced learners of English of different stress pattern in '*Street*' and '*Avenue/Road*' examples.

For complete list of NNs and words that were used as distractors with their frequencies and alternation in stress pattern see section Appendices.

<b>Stressed syllable</b>	<b>1<sup>st</sup></b>	<b>2<sup>nd</sup></b>	<b>3<sup>rd</sup></b>	<b>4<sup>th</sup></b>
<b>cf</b>	20			
<b>cs</b>		7	12	1
<b>Derived words</b>	1	19	20	

*Table 3:* Distribution of stress in all the stimuli

The experiment was created in Praat (Boersma and Weenink, 2011). MFC (Multiple Forced Choice) Experiment in Praat was used in order to make it understandable and easy for participants, all the participants were familiar with Praat software, as they regularly use it in classes. This program was chosen also because of its scripts, which can be easily adjusted to individual targets of various experiments.

Two scripts were created for each part of the experiment; the first one was only practice for testing and it included only four sounds each recorded twice. The second one was the actual test with 80 sounds each recorded twice. So the total number of sounds was 168. Because of the Praat script option ‘Permute Balance No Doublets’ one sound was never recorded twice in a row. The order of sounds was randomized. For both scripts see section Appendices.

Even though, in some cases the stress pattern differs, in the perception test NNs were pronounced unambiguously. Such NNs are marked in the complete list of NNs with their alternative stress pattern.

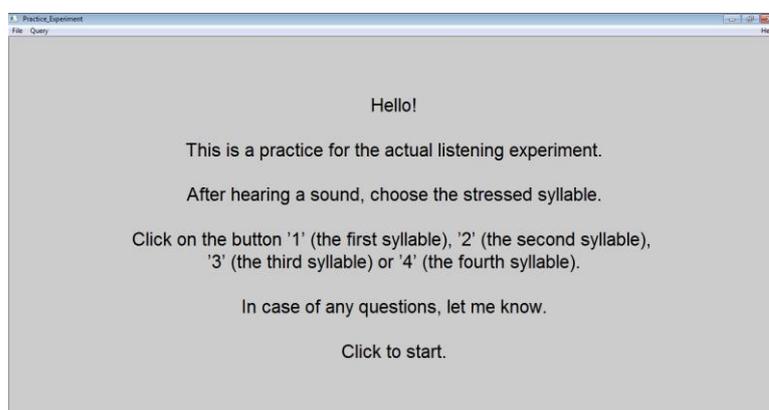
As evident in Ingo Plag’s study (2006), which is briefly described in section 3.1, when embedded in larger units compounds make the experiment even more difficult for the participants. It was also suggested by Bauer that “if the forms are attested as parts of utterances, there is likely to be quite a lot of variation in stress assignment”(1983, 103). Thus, in order to avoid sentence intonation difficulties and to make the experiment as easy as possible for the participants, I decided to use NNs in separation, not embedded in a sentence, all being pronounced in citation form. Also, to obtain all the answers in the perception test, the participant had to choose one of possible syllables so they could proceed to another one.

### **3.2.2 Procedure**

All the participants used the same type of computer as well as headphones that are available in the classroom. Both tests were done in the classroom at the Department of English and American Studies at Palacký University.

#### **3.2.2.1 Perception Test**

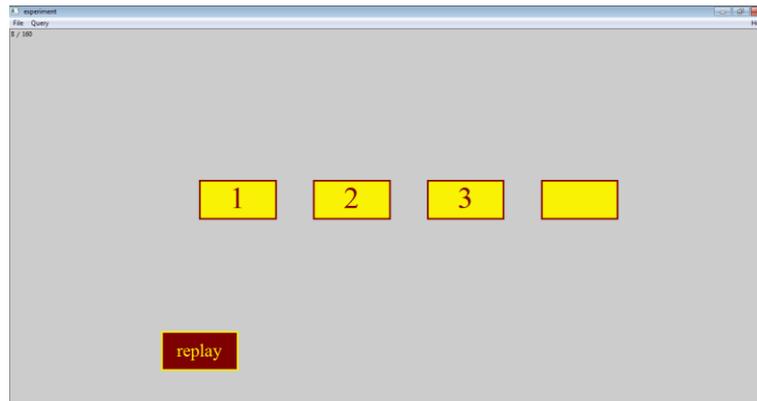
The participants who took part in the experiment were said that the purpose of this experiment is to explore Czech learners' perception of English stress. Even though the practice experiment as well as the actual one includes the introductory screen covering instructions (see *Figure 1*), they were instructed also orally before testing. They were told to mark the stressed syllable by clicking on the relevant button with a number.



**Figure 1: Introductory screen for the practice experiment**

Participants were familiarized with the order *practise test-actual test*. After doing this training, they were instructed to click to proceed to the real experiment.

The actual experiment comprised of 80 sound files that were played and repeated in randomized order. For every sound file, there was one time option to replay it. Every time there was only relevant number of buttons corresponding to the number of syllables as visible in *Figure 2*. The participants were prompted before the practice test to ask questions in case of any hesitation.

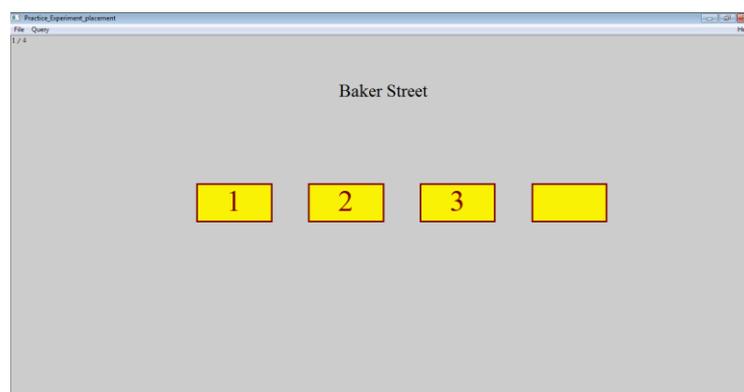


**Figure 2: Screen for the task “London Bridge”**

At the end of the experiment they were asked to fill out a short questionnaire about themselves. Understandably, the experiment was anonymous but the participants were asked to type their initials, state the sex, the variety of English, they use, participant number and also whether they suffer from any hearing problems. The results were then saved as tab-separated file into the folder ‘results’. For the complete list of results see section Appendices.

### **3.2.2.2 Stress Placement Test**

The stress placement experiment took place one week after the perceptual experiment. The participants were asked to write the same participant number as previous week, in order to pair up both their results. Before the actual testing they were instructed. This time, the experiment was based on their awareness or intuition so the sound was turned off. Again, they were prompted to ask questions in case of any hesitation.



**Figure 3: Screen for the task “Baker Street”**

As visible in *Figure 3* the participants saw the orthographic form of the expression on the screen. They were given 84 expressions in total, 4 of them being

part of the practice test. The stimulus set was the same as during the perceptual test with the only difference that the expressions were displayed only once.

After the experiment the results were saved as tab-separated file into the folder 'results' and evaluated.

### ***3.2.2.3 Collecting Baseline data***

A female native speaker of American English was instructed by skype and received a folder with the experiment and instructions by email. The other two I met personally and so they were instructed orally.

They did the experiment on laptops with headphones in a quiet room.

For practical reasons it was not possible to do the two parts of the experiment on separate days. The native speakers were asked to take a short break after doing the perceptual experiment and then continue with the placement experiment.

### ***3.2.3 Analysis***

In order to get a table where all the obtained data could be compared and the evaluation made, Praat script was written. Results were organized into a table according to the participants. The stimuli were organized into columns according to relevant groups: CF- compound with stress on the first element, CS- compound with stress on the second element and D- derived words.

Because the number of syllables varies within given stimulus set, expressions in each group were divided into subtypes according to the number of syllables. For each subtype, for example three-syllabic derived words; an average score of correct answers was generated. The total average was based on individual averages of all subtypes.

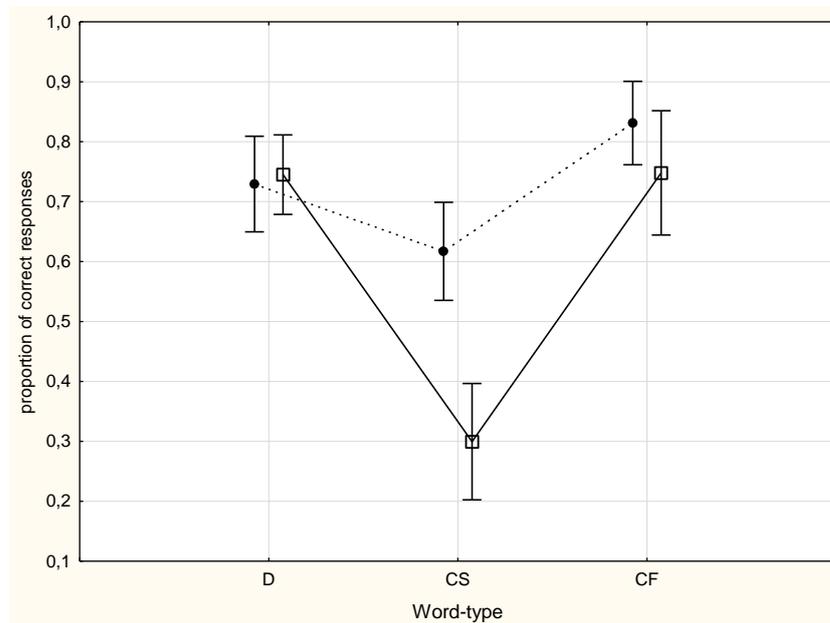
Praat also measured the reaction time of all the responses. When the participant hesitated too long the result was marked as an outlier and was excluded from the analysis. The last column in the table gives a number of outliers of each participant.

### ***3.2.4 Results***

The proportion of correct responses were submitted to repeated measures analysis of variance ANOVA with two within-subject factors: factor Mode had two levels, listening and assigning stress according to intuitions of the participants. Factor

Word Type had three levels coded as CF (a compound with stress on the first element), CS (a compound with stress on the second element) and D (a derived word). The analysis produced a significant result both for the factor Mode ( $F(1.24) = 40.450$ ,  $p < .0001$ ) and the factor Word-type ( $F(2.48) = 30.376$ ,  $p < .0001$ ). See *Figure 4*.

Subsequent post-hoc Tukey tests showed that in the listening mode the compounds with end-stress induced a significantly smaller proportion of correct results than the compounds with fore-stress ( $p < .001$ ) but did not differ from the derived words. In the intuition mode the end-stress compounds differed significantly from both fore-stressed compounds and derived words ( $p < .001$ ).



**Figure 4: Significant interaction between factor Mode and Word-type.**

**Mode Listening = dashed line, Mode Intuition = continuous line**

Another RM ANOVA was conducted with the reaction time as the dependent variable and the same two factors of Mode and Word-type as in the previous analysis. The results show that only the factor Word-type was significant ( $F(2, 48)=4.2883$ ,  $p = .019$ ). There was no significant interaction between Mode and Word-type.

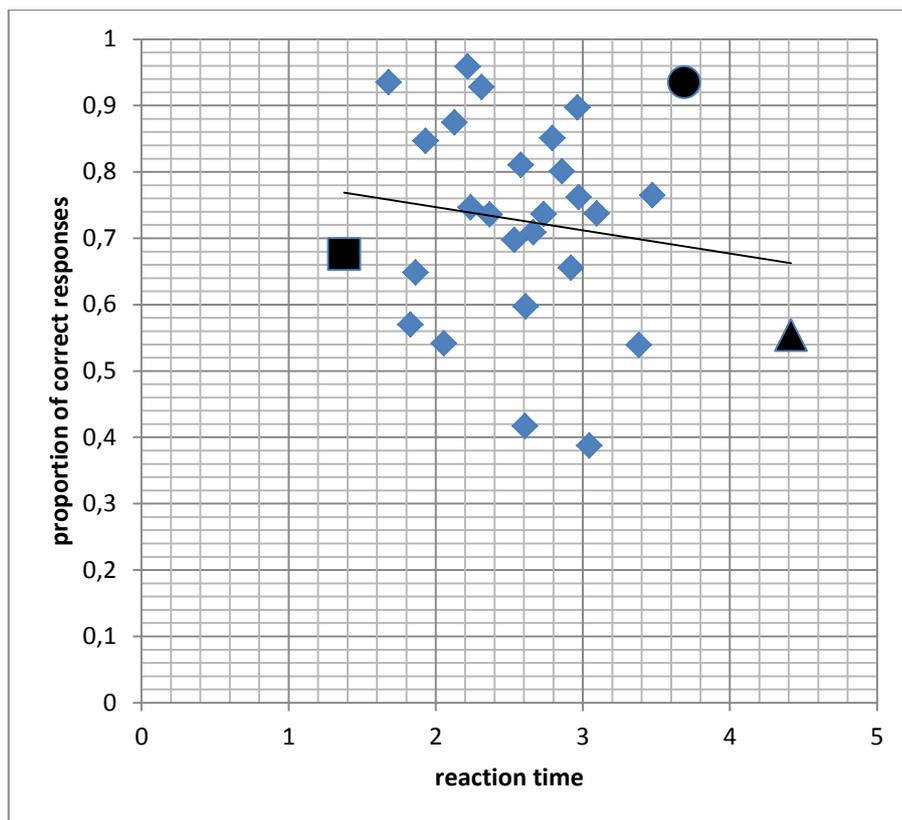
According to the post-hoc Tukey HSD test, the only significant difference was between end-stressed compounds and fore-stressed compounds (0.018), with the reactions to the end-stressed compounds being slower.

#### ***3.2.4.1 Comparing NNS data to the baseline NS Data***

Although it was not possible to conduct another RM ANOVA for comparing the data with the native speakers (because of the small number of native speakers and their variable responses), we tried to demonstrate their comparison at least tentatively.

As we can see in *Figure 5* majority of Czech learners of English is more accurate in perception than native speakers. Four non-native speakers scored comparatively high as the most accurate native speaker. Looking at the reaction times, all Czech learners are faster in deciding about the stressed syllable than two native speakers.

The correlation between Reaction time and the proportion of correct responses was not significant ( $r = -.1492$ ).

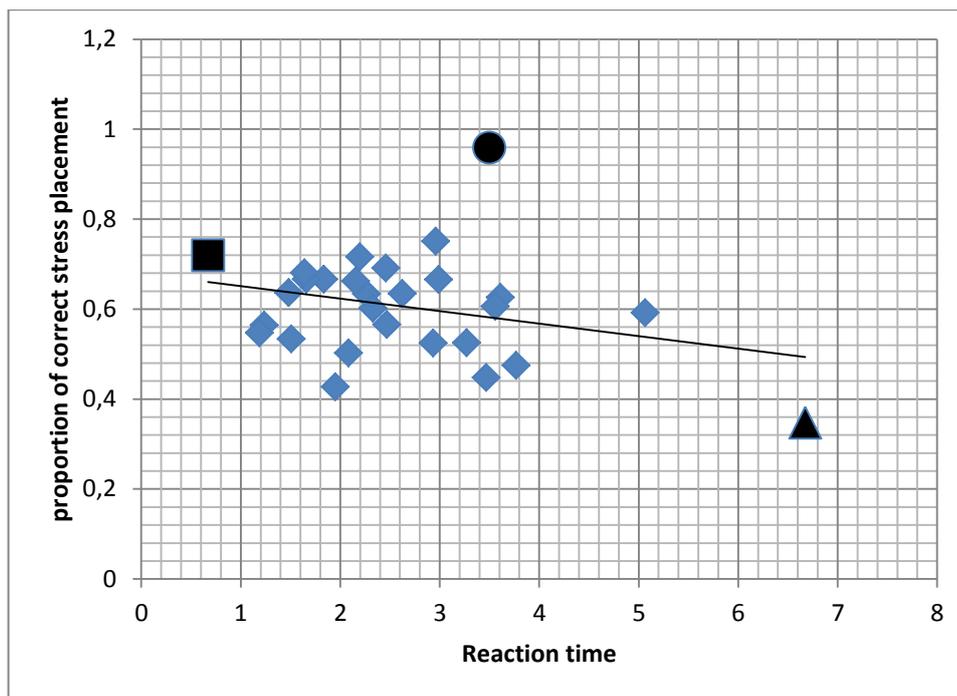


**Figure 5: Correlation between correct responses and Reaction times in Perception Test.**

**Square = RH native speaker, circle = AP native speaker, triangle = CS native speaker, diamonds = non-native speakers**

In *Figure 6* we can see the comparison of native speakers to non-native speakers in the Stress Placement Test. Expectedly, the best score at the Stress Placement Test based on one's own intuition had the native speaker AP. His proportion of correct responses was above 95%. No non-native speaker scored as high or comparably high as the best native speaker. Though, the second best proportion of correct responses had non-native speaker. According to the reaction times one can say that non-native speakers are also faster in their judgements than two non-native speakers. Surprisingly, the lowest proportion of correct responses based on his own intuition as well as the slowest reaction times had American native speaker CS.

Correlation between the reaction time and the proportion of correct responses is not significant ( $r = -.2934$ ).



**Figure 6: Correlation between correct responses and Reaction times in the Stress Placement Test.**

**Square = RH native speaker, circle = AP native speaker, triangle = CS native speaker, diamonds = non-native speakers**

## 4 Discussion

The results of the experiment showed that the factor Word-type is significant in both perception part as well as in the part when the participants decided according to their own intuition. The most difficult stress pattern for Czech learners was the stress on the second constituent of the compound.

Undoubtedly, the lower proportion of correct responses at the compounds with stress on the second element during the listening test could have been caused by the participants' difficulty with syllabification of the given expressions. At the compounds with stress on the first syllable the participants did not have to divide the expression into syllables and count, hence this factor could have influenced the result. Though, it seems that participants did not have this difficulty with syllabification at derived words since the Word-type Derived words does not differ significantly from the Word-type Compounds stressed on the first constituent.

As Post-hoc Tukey HSD test revealed, the only significant difference between the Perception test and Stress Placement test across Modes was in the compounds that are stressed on the second constituent. Czech speakers intuitively put the stress on the second constituent only in few cases. One can conclude that when they see the orthographic form on the screen, they perceive the expression as a compound. And in the dependence on what they were taught in their morphology classes they stress the compounds on the first constituent according to CSR.

Undoubtedly, the frequency of the compounds stressed on the second constituent is in comparison to the compounds stressed on the first constituent very low and such expressions are usually taken as exceptional forms. Because of their low frequency putting stress on the second constituent of the compound is not common for Czech learners of English.

Nevertheless, the influence of L1 could play also significant role as the end-stressed expressions could have been perceived as having the stress pattern most different from the Czech one.

It is interesting that from the Stress Placement part of the experiment there were less outliers than from the Perception test.

There were individual differences among the participants. Some participants had problems with perception of stress in all three categories; hence their ability to hear stress is generally rather low.

The answers of individual native speakers were considerably variable. Native speaker CS seems to be the slowest in his decisions and with the worst score during the Stress Placement experiment. Also at Perception experiment his score is under the average of non-native speakers. He himself confessed certain difficulty with syllabification. He was also unfamiliar with this type of test as this was the first time he did this kind of exercise. So, he is not an ideal control subject. On the other hand native speaker AP scored the highest score during the Stress Placement experiment, and one of the highest scores during the Perception test. According to the comparison of reaction times of individual participants from the Perception Experiment, his reactions were among the slowest; nevertheless, his score was one of the best. Similarly, during the Stress Placement experiment his decisions took him more than an average time. His results could have been influenced by the fact that he works as an English teacher and he was quite

familiar with this kind of testing. This variability of native speakers' scores was surprising for me, nevertheless, it is said that there is indeed a disagreement between speakers about the stress pattern on given item; the variation of stress pattern in given compound can be seen also in individual speaker's responses (Bauer 1983, 103).

Based on acquired data, it can be deduced that Czech learners of English are not aware of the stress pattern different from CSR or they prefer stress on the first constituent of the compound. Despite the fact that the stress pattern of given expressions should be learned together with pronunciation and spelling (MacCarthy 1967, 157), Czech learners probably do not follow this recommendation.

#### **4.1 Further explorations**

Since the participants could have struggled with syllabification of given expressions, new experiment with compounds consisting of two syllables only could yield more valuable results. One word would correspond to one syllable.

Also, the length of the experiment could be reduced as it was visible on some participants that at the end they were rather bored. Some participants also said that they felt certain pain in the wrist at the end of the testing. I have to admit that more than 164 clicks on the computer mouse combined with small movements of the wrist could be painful, so maybe the combination with the keyboard would be more comfortable for the participants.

Unfortunately I was not able to secure more native speakers to have a control group. The variation of the native speakers' responses surprised me; hence I would like to explore this area more with the data of more native speakers.

### **5 Conclusion**

To conclude, the topic of this thesis was aimed to the recognition of stress in English noun-noun compounds by Czech learners. As Czech learners a group of students of English at the Department of English and American Studies at the Palacký University participated.

Literature on English compounds and stress in Czech and English was reviewed. Two methods were used in this thesis. The first method was the Perception Experiment. The design of the test was MFC Experiment conducted in

Praat with sound files recorded from *Longman Pronunciation Dictionary* (2008). The participants were told to mark the stressed syllable by clicking on the relevant button with the number. They heard each sound twice. The results of the experiment revealed that the type of the word was significant factor, as the participants had the highest score in compounds with stress on the first syllable and the lowest score at compounds stressed on the second constituent.

The second method was the Stress Placement Test, which was based on one's own intuition. This time participants saw the orthographic form on the screen but did not hear the sound. Their task was again to mark the stressed syllable by clicking on the relevant button. The analysis revealed that the lowest score was at the compounds with end-stress. It is interesting that across Modes (Perception Test and Stress Placement Test) the only significant difference was revealed in compounds stressed on the second constituent. Czech learners of English seem to put stress intuitively on the first constituent rather than on the second constituent.

As it is visible from both parts of the experiment, the hypothesis of this thesis that Czech learners prefer the stress pattern on the first constituent of the compound was proved, even though the results of experiment could have been influenced by other factors too.

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### **Corpora**

*The British National Corpus*, version 3 (BNC XML Edition). 2007. Distributed by Oxford University Computing Services on behalf of the BNC Consortium.

URL: <http://www.natcorp.ox.ac.uk/>.

## 7 Appendices

In the section below you can find the data I referred to in my thesis. The data are organised as follows.

Appendix A: Complete list of fore-stressed compounds,

Appendix B: Complete list of end-stressed compounds,

Appendix C: Complete list of Derived words,

Appendix D: Table of average results of all participants.

Appendix E : Both parts of the experiment including Praat scripts and folder with results could be found in more convenient form in attached CD.

### Appendix A: Complete list of fore-stressed compounds

	<b>CF fore-stress</b>	<b>Alternative stress pattern</b>	<b>BNC FQ</b>
1	'Oxford Street		193
2	'opera house		54
3	'table cloth		18
4	'summer school		83
5	'chocolate cake	Am.E- Chocolate 'cake	50
6	'rain forest		123
7	'Downing Street		631
8	'Labour Party		4214
9	'greenhouse effect		275
10	'pineapple juice		13
11	'theme park		118
12	'taxi driver		250
13	'tea cup		30
14	'ozone layer		322
15	'baby carriage		15
16	'phone call		657
17	'soap opera		34
18	'night shift		82
19	'bus stop		203
20	'bird flu		21

**Appendix B:** Complete list of end-stressed compounds

	<b>CS end-stress</b>	<b>Alternative stress pattern</b>	<b>BNC FQ</b>
1	London 'Bridge		94
2	Madison 'Avenue		25
3	school 'year		41
4	town 'hall		728
5	half 'marathon		26
6	Saturday 'night		737
7	silver 'foil	'silver foil	29
8	apple 'pie		93
9	country 'house		314
10	acid 'rain		440
11	Christmas 'pudding		80
12	Christmas 'Day		371
13	morning 'star		46
14	milk 'shake	'milk shake	13
15	baby 'boy		70
16	olive 'oil		377
17	peanut 'butter	'peanut butter	54
18	school 'uniform		70
19	milk 'chocolate		27
20	bass gui'tar		39

### Appendix C: Complete list of derived words

	D derived words	Alternative stress pattern	BNC FQ
1	'mechanism		2774
2	pho'nology		173
3	in'credible		1204
4	psy'chology		2623
5	pho'tography		1124
6	inte'llectual		3631
7	ad'venturous		446
8	under'standing		9536
9	repre'sent		15407
10	imma'ture		442
11	ex'aminer		551
12	elec'trician		288
13	arti'ficial		1983
14	a'stronomy		350
15	proble'matic		749
16	recre'ation		953
17	rede'fine		295
18	ciga'rette	Am.E. 'cigarette	3332
19	enter'tain		1373
20	kanga'roo		174
21	ex'haustive		329
22	sus'tainable		677
23	disa'pproval		501
24	unim'portant		397
25	par'ticipant		2761
26	dis'covery		3452
27	intro'duction		6809
28	im'possible		6826
29	per'fectionist		109
30	disad'vantage		2048
31	devi'ation		821
32	monu'mental		370
33	tra'dition		6615
34	fan'tastic		1134
35	mo'rality		1227
36	compe'tition		10068
37	disre'spectful		50
38	reve'lation		1402
39	de'mocracy		4525
40	de'partment		21779

**Appendix D:** Table of average results of all participants

SPEAKERS	Perception Test (Averages)		Stress Placement Test (Averages)	
	Reaction time	Correct responses	Reaction time	Correct responses
NS_RH	1,375997	0,676324	0,670281	0,719535
NS_CJ	4,414272	0,554206	6,673651	0,34754
NS_AP	3,688552	0,935272	3,498365	0,959259
AB_f,txt	1,931445	0,846605	2,263063	0,633573
AD_f,txt	2,971269	0,761699	2,62407	0,634319
AG_f,txt	3,045213	0,387661	3,767674	0,474448
AV_f,txt	2,964531	0,897126	2,957602	0,750722
BS_f,txt	2,857901	0,800869	2,466634	0,565368
DH_m,txt	2,734354	0,736307	2,19594	0,715633
DN_m,txt	3,09366	0,737309	2,987053	0,665608
ES_f,txt	2,127304	0,874235	1,479757	0,636654
EV_f,txt	2,663528	0,709029	5,065049	0,592063
HM_f,txt	2,91915	0,655511	2,932888	0,524691
JK_m,txt	2,578947	0,810189	1,236393	0,564103
JM_f,txt	2,05622	0,541406	1,50867	0,533333
KB_f,txt	2,216671	0,958577	1,834509	0,666204
KP_f,txt	2,3662	0,73578	2,155078	0,661817
LB_f,txt	2,237017	0,746432	2,45918	0,690801
LM_f,txt	3,47358	0,764634	3,610171	0,625669
MF_m,txt	2,793943	0,850947	3,556269	0,606166
ND_f,txt	1,86302	0,648383	2,32881	0,601411
P`_f,txt	2,610444	0,597444	2,083422	0,502249
PP_f,txt	2,311975	0,928044	1,659451	0,666623
RK4_f,txt	3,380201	0,538946	3,468037	0,447821
RK5_f,txt	2,5346	0,697261	3,268389	0,524784
VV_f,txt	2,607304	0,416989	1,95136	0,427066
wAK_m,txt	1,680576	0,935159	1,638569	0,680823
wLL_f,txt	1,82828	0,570068	1,186652	0,54709

