PHONOLOGICAL AND MORPHOLOGICAL ANALYSIS BY SKILLED READERS OF SERBO-CROATIAN*

Laurie B. Feldman†

Abstract. Two distinctive properties of Serbo-Croatian, the major language of Yugoslavia, have been exploited as tools in the study of reading. First, most literate speakers of Serbo-Croatian are facile in two alphabets, Roman and Cyrillic. The two alphabet sets intersect and words composed exclusively from the subset of characters that occur in both alphabets can be assigned two phonological interpretations— one by treating the characters as Roman graphemes and one by treating the characters as Cyrillic graphemes. By exploiting the availability of two overlapping alphabets, the nature of phonological codes and how they figure in lexical access has been explored. Second, the inflectional and derivational morphology in Serbo-Croatian is complex, and extensive families of morphologically-related words exist. This complex morphology permits one to investigate how morphological structure is appreciated by the proficient language user. In the present report, results of a series of experiments that investigated phonological and morphological analysis in word recognition tasks by adult readers of Serbo-Croatian are summarized and discussed in terms of a characterization of skilled reading in Serbo-Croatian. To anticipate, the skilled reader of Serbo-Croatian appears to appreciate both phonological and morphological components of words.

The Bialphabetic Environment

Serbo-Croatian is written in two different alphabets, Roman and Cyrillic. The two alphabets transcribe one language and their graphemes map simply and directly onto the same set of phonemes. These two sets of graphemes are, with certain exceptions, mutually exclusive. Most of the Roman and Cyrillic letters occur only in their respective alphabets. These are referred to as unique letters. There are, however, a limited number of letters that are shared by the two alphabets. In some cases, the phonemic interpretation of a shared letter is the same whether it is read as Cyrillic or as Roman; these are referred to as common letters. In other cases, a shared letter has two phonemic interpretations, one by the Roman reading and one by the Cyrillic reading; these are referred to as ambiguous letters1 (see Figure 1). Whatever their category, the individual letters of the two alphabets have phonemic

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[HASKINS LABORATORIES: Status Report on Speech Research SR-85 (1986)]
### Table 1

Types of Letter Strings and Their Lexical Status

<table>
<thead>
<tr>
<th>COMPOSITION OF LETTER STRING</th>
<th>PHONEMIC INTERPRETATION</th>
<th>MEANING</th>
<th>COMPOSITION OF LETTER STRING</th>
<th>PHONEMIC INTERPRETATION</th>
<th>MEANING</th>
</tr>
</thead>
<tbody>
<tr>
<td>-----------------------------</td>
<td>-------------------------</td>
<td>-------------</td>
<td>------------------------------</td>
<td>-------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td><strong>AMBIGUOUS and COMMON(^1)</strong></td>
<td></td>
<td></td>
<td><strong>UNIQUE and COMMON(^2)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BETAP</td>
<td>Roman /betap/</td>
<td>meaningless</td>
<td>VETAR</td>
<td>Roman /vetar/</td>
<td>wind</td>
</tr>
<tr>
<td></td>
<td>Cyrillic /vetar/</td>
<td>wind</td>
<td></td>
<td>Cyrillic</td>
<td>impossible</td>
</tr>
<tr>
<td></td>
<td>Roman /pop/</td>
<td>priest</td>
<td></td>
<td>Roman</td>
<td>impossible</td>
</tr>
<tr>
<td></td>
<td>Cyrillic /ror/</td>
<td>meaningless</td>
<td></td>
<td>Cyrillic /pop/</td>
<td>priest</td>
</tr>
<tr>
<td>POP</td>
<td>Roman /potop/</td>
<td>flood</td>
<td></td>
<td>Roman /rotor/</td>
<td>motor</td>
</tr>
<tr>
<td></td>
<td>Cyrillic /rotor/</td>
<td>motor</td>
<td></td>
<td>Cyrillic /rotor/</td>
<td>impossible</td>
</tr>
<tr>
<td></td>
<td>Roman /pajotc/</td>
<td>meaningless</td>
<td></td>
<td>Roman /pajotc/</td>
<td>meaningless</td>
</tr>
<tr>
<td></td>
<td>Cyrillic /rajos/</td>
<td>meaningless</td>
<td></td>
<td>Roman /rajos/</td>
<td>meaningless</td>
</tr>
<tr>
<td><strong>COMMON</strong></td>
<td></td>
<td></td>
<td>RAJOS</td>
<td>Cyrillic</td>
<td>impossible</td>
</tr>
<tr>
<td></td>
<td>Roman /mama/</td>
<td>mother</td>
<td></td>
<td>Roman</td>
<td>impossible</td>
</tr>
<tr>
<td>MAMA</td>
<td>Cyrillic /mama/</td>
<td>mother</td>
<td></td>
<td>Cyrillic /mama/</td>
<td>mother</td>
</tr>
<tr>
<td></td>
<td>Roman /taka/</td>
<td>meaningless</td>
<td></td>
<td>Romanian /taka/</td>
<td>meaningless</td>
</tr>
<tr>
<td>TAKA</td>
<td>Cyrillic /taka/</td>
<td>meaningless</td>
<td></td>
<td>Romanian /taka/</td>
<td>meaningless</td>
</tr>
</tbody>
</table>

\(^1\)Phonologically bivalent letter strings

\(^2\)Phonologically unequivocal controls

Adapted with permission of the American Psychological Association from Feldman and Turvey, 1983
interpretations (classically defined) that are virtually invariant over letter contexts. (This reflects the phonologically shallow nature of the Serbo-Croatian orthography.) Moreover, all the individual letters in a string of letters, be it a word or nonsense, are pronounced--there are no letters made silent by context (see Feldman & Turvey, 1983; Lukatela, Popadić, Ognjenović, & Turvey, 1980; Lukatela, Savić, Gligorević, Ognjenović, & Turvey, 1978).

![Serbo-Croatian Alphabet](image)

**Figure 1.** The characters of the Roman and Cyrillic Alphabets (printed from Feldman and Turvey, 1983, with permission from the American Psychological Association).

Given the relation between the two Serbo-Croatian alphabets, it is possible to construct a variety of types of letter strings. A letter string that contains at least one uniquely Roman character in addition to shared characters would be read in only one way and it could be either a word or meaningless. A letter string composed entirely of common and ambiguous letters is bivalent. That is, it could be pronounced in one way if read as Roman and pronounced in a distinctly different way if read as Cyrillic; moreover, it could be a word when read in one alphabet and meaningless when read in the other or it could represent two different words, one in one alphabet and one in the other, or finally it could be meaningless in both alphabets (see Table 1).
Consider the word that means WIND. As with any word in Serbo-Croatian, it can be written in either Roman characters or Cyrillic characters. In its Roman transcription (i.e., VETAR), the word includes unique and common characters and is phonologically unequivocal. By contrast, in its Cyrillic transcription (i.e., BETAP), the word includes only ambiguous and common characters and therefore is phonologically bivalent. By its Cyrillic reading it is a word; by its Roman reading it is meaningless. In the present series of experiments, two forms of the same word are compared where one is phonologically bivalent and the other is phonologically unequivocal. Notice that by comparing two printed forms of the same word, problems of equating familiarity, richness of meaning, length and number of syllables are eliminated. To reiterate, the letter strings exemplified by BETAP and VETAR are the same word and, therefore, identical in all respects but one, namely, the number of phonological interpretations.

Phonological Analysis in Skilled Readers

When bi-alphabetic adult readers of Serbo-Croatian performed a lexical decision task (i.e., Is this letter string a word by either a Roman or a Cyrillic reading?), single letter strings composed of ambiguous and common characters (i.e., those letter strings that could be assigned both a Roman and a Cyrillic alphabet reading) typically incurred longer latencies than the phonologically unequivocal alphabet transcription of the same word. This outcome has been reported both in a mixed alphabet context where the lexical interpretation of a letter string was sometimes in Roman and sometimes in Cyrillic (Feldman & Turvey, 1983; Lukatela et al., 1980) and a pure alphabet context where the lexical interpretation was always in Roman (Feldman, 1983; Lukatela et al., 1978). The effect of phonological ambiguity was significant both for bivalent words and pseudowords, but it was more robust for words. In characterizing the effect of ambiguity in lexical decision, several outcomes proved essential. First, the effect of phonological ambiguity did not vary as a function of word familiarity. For each word, decision latency to its phonologically unequivocal form was used as an index of familiarity and was correlated with the difference in decision latency between the bivalent and unequivocal forms of the word. In lexical decision, that correlation approached zero (Feldman & Turvey, 1983). Second, words composed entirely of common letters (with no ambiguous or unique letters) such as MAMA were accepted as words no more slowly than letter strings that included common and unique letters. Likewise, pseudowords composed entirely of common letters such as TAKA were rejected as words no more slowly than letter strings that included common and unique letters. Note that the distinction between common and ambiguous letters derives from their phonology: each type of letter occurs in both alphabets but only the latter have two phonemic interpretations. The foregoing discrepancy of outcomes suggests that it is phonological bivalence rather than a visually-based alphabetic bivalence that governs the slowing of decision latencies (see Lukatela et al., 1978, 1980, for a complete discussion). Third, lexical decision latencies to letter strings composed entirely of ambiguous and common letters were always slower whether both alphabet readings yielded a positive response such as "POTOP" (Lukatela et al., 1980) or a negative response such as "PAJOC" (Feldman, 1981; Lukatela et al., 1978, 1980) or the Cyrillic reading and the Roman reading yielded opposite responses such as "BETAP" or "POP" (Feldman & Turvey, 1983; Lukatela et al., 1978, 1980). This outcome invalidates a decision stage account of the detrimental due to bivalence that posits some type of post-lexical interference between conflicting lexical judgments. Moreover,
insofar as lexical decision is alleged to be susceptible to decision-stage influences in a way that naming is not (Balota & Chumbley, 1984; Seidenberg, Waters, Sanders & Langer, 1984), it is noteworthy that the detriment due to bivalence is generally enhanced in naming relative to lexical decision. Finally, the difference in decision latency between the bivalent and unequivocal forms of a word increased as the number of ambiguous (but not common) characters increased (Feldman & Turvey, 1983). It was eliminated, however, by the presence of a single unique letter (Feldman, Kostić, Lukatela, & Turvey, 1983). These findings imply that a segmental phonology is assembled from an analysis of a letter string’s component orthographic structure and that sometimes (multiple) phonological interpretations are generated. The foregoing results of lexical decision experiments with phonologically bivalent letter strings provide evidence that access to the lexicon in Serbo-Croatian necessarily involves an analysis that 1) is sensitive to phonology and component orthographic structure, 2) is not sensitive to the lexical status of the various alphabetic readings. These results have been interpreted as evidence for an assembled segmental phonology in Serbo-Croatian.

In an attempt to understand conditions under which phonological codes and lexical knowledge do interact in Serbo-Croatian, we have begun to explore associative priming of phonologically bivalent words (Feldman, Lukatela, Katz, & Turvey, forthcoming). In this procedure, target words are sometimes presented in the context of another word that is associated with it and decision latencies to the target with and without its associate are compared. Phonologically bivalent words and the unequivocal alphabet transcription of those same words were presented as targets in a lexical decision task. Half of the bivalent targets were words by the Cyrillic reading and half were words by their Roman reading. On some proportion of trials, target words were presented in the context of another word that was associatively related to it and preceded it by 700 ms. Sometimes, the alphabet of the associate was congruent with the alphabet in which the target reading was a word. Sometimes the associate and the target reading were alphabetically incongruent. Results showed significant facilitation in the context of associates, evidence of lexical mediation. More interestingly, decision latencies for bivalent letter strings that are words by one of their alphabet readings were reduced less when those words are preceded by an associate printed in the other, incongruent alphabet than when the associate was printed in the same alphabet as the word reading of the target. This outcome suggests alphabetic congruency as a second source of facilitation. For example, bivalent BETAP, which means WIND when read as Cyrillic, was preceded by the word for STORM. Inspection of word means in Table 2 reveals that target decision latencies for BETAP type words were 64 ms faster when preceded by the Cyrillic form of the word for STORM than by the Roman form of the same word. By contrast, target decision latencies for the same words written in their phonologically unequivocal form were facilitated equally by the prior presentation of an associated word printed in either the congruent or incongruent alphabet. For example, WIND written in Roman, namely VETAR, is phonologically unequivocal and decision latencies were not significantly different when the word for STORM appeared in its Cyrillic or Roman form. Likewise for pseudowords, alphabet congruency had no effect (see Table 2).
Table 2

Lexical Decision (ms) to Bivalent Words and their Unequivocal Controls in the Context of Alphabetically Congruent and Alphabetically Incongruent Associates

<table>
<thead>
<tr>
<th></th>
<th>BIVALENT (BETAP)</th>
<th>UNEQUIVOCAL (VETAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPHABET OF ASSOCIATE:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONGRUENT</td>
<td>709</td>
<td>672</td>
</tr>
<tr>
<td>INCONGRUENT</td>
<td>775</td>
<td>685</td>
</tr>
<tr>
<td>(NO ASSOCIATE)</td>
<td>845</td>
<td>765</td>
</tr>
</tbody>
</table>

From Feldman, Lukatela, Katz, and Turvey (in preparation)

In summary, lexical decision latencies for phonologically bivalent letter strings are reduced significantly more when preceded by associates that are alphabetically congruent with the word reading of the letter string, than by associates that are not congruent. By contrast, decision latencies for phonologically unequivocal letter strings are not influenced by the alphabet of the associate. Associative and alphabetic sources of facilitation can be identified. Whereas facilitation by association occurs for all the words and is assumed to be lexical in origin, facilitation by alphabet congruency of associate and target was important only for bivalent letter strings. The special dependency of alphabetic congruency on ambiguity suggests that alphabetic priming and phonological ambiguity have a common origin.

In summary, studies of phonological ambiguity indicate that skilled readers of Serbo-Croatian analyze words phonologically. In judging letter strings composed exclusively of ambiguous and common letters for a lexical decision, adult readers appear to assign a phonological interpretation (or several) to each character (Feldman & Turvey, 1983). At the same time, the alphabet in which a prior occurring associate is printed appears to bias the generation or the evaluation of various phonological interpretations of a bivalent letter string. An analogous effect is absent in phonologically unequivocal words and in all pseudowords.

Morphological Analysis in Skilled Readers

The effect of phonological ambiguity has provided a means to evaluate the analytic skills of readers with respect to morphological components. As noted above, the Serbo-Croatian language, in a manner that is characteristic of Slavic languages generally, makes extensive use of inflectional and derivational morphology. A noun can appear in any of seven cases in the singular and in the plural where the inflectional affix varies according to its gender, number, and case. For example, the words STAN and KORA, which
mean "apartment" and "crust," respectively, in nominative case can be inflected into six other cases in the singular and in the plural, and different inflectional affixes mark each case (with some redundancy of affixes). Similarly, derived forms for "little apartment" or "thin crust" can be generated by adding one of the diminutive affixes (viz., CICICA, ENCE, AK) to the base word to produce STANCIĆ and KORICA, respectively. The prevalence of inflectional and derivational formations in Serbo-Croatian is evidence of its productiveness (see Table 3).

### Table 3

Examples of Morphologically-related Words Formed with the Base Morpheme "PIS" Meaning "write"

<table>
<thead>
<tr>
<th>EXAMPLE</th>
<th>DERIVATIONAL PREFIX</th>
<th>BASE MORPHEME</th>
<th>DERIVATIONAL SUFFIX</th>
<th>INFLECTIONAL SUFFIX</th>
<th>MEANING*</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPIS</td>
<td>0</td>
<td>PIS</td>
<td></td>
<td></td>
<td>description</td>
</tr>
<tr>
<td>OPISI</td>
<td>0</td>
<td>PIS</td>
<td>I</td>
<td></td>
<td>descriptions (nom. plural)</td>
</tr>
<tr>
<td>PIŠEM</td>
<td>PIŠ</td>
<td></td>
<td>EM</td>
<td></td>
<td>I write (1p. sing)</td>
</tr>
<tr>
<td>PIŠETE</td>
<td>PIŠ</td>
<td></td>
<td>ETE</td>
<td></td>
<td>you write (2p. plural)</td>
</tr>
<tr>
<td>PISAC</td>
<td>PIS</td>
<td>AC</td>
<td></td>
<td></td>
<td>writer</td>
</tr>
<tr>
<td>PISCIMA</td>
<td>PIS</td>
<td>C</td>
<td>IMA</td>
<td></td>
<td>writers (dat. plural)</td>
</tr>
<tr>
<td>PISMO</td>
<td>PIS</td>
<td>MO</td>
<td></td>
<td></td>
<td>letter</td>
</tr>
<tr>
<td>POPIS</td>
<td>PO</td>
<td>PIS</td>
<td></td>
<td></td>
<td>inventory</td>
</tr>
<tr>
<td>POTPIS</td>
<td>POT</td>
<td>PIS</td>
<td></td>
<td></td>
<td>signature</td>
</tr>
<tr>
<td>SPISAK</td>
<td>S</td>
<td>PIS</td>
<td>AK</td>
<td></td>
<td>list</td>
</tr>
</tbody>
</table>

*all words are in nominative singular unless otherwise noted

One way in which sensitivity to morphological constituents is construed is in terms of a morphological parser that operates prior to lexical access such that affixes are stripped from a multimorphemic word and the base morpheme serves as the primary unit for lexical search (see Caramazza, Miceli, Silveri, & Laudanna, 1985). Frequency of the base unit and the whole word as well as the difficulty of segmenting the appropriate base unit figure significantly in decision latency (Taft, 1979; Taft & Forster, 1975). In one
experiment (Feldman et al., 1983) the effect of phonological ambiguity was
exploited to assess whether the base morpheme or the whole word serves as the
unit for lexical access of inflected words in Serbo-Croatian. Words were
presented in nominative and dative case for a lexical decision. Words were
selected so that the nominative case and the base morpheme (i.e., nominative
minus inflectional affix for most singular nouns) were phonologically bivalent
in the Cyrillic alphabet and phonological unequivocal in Roman. For example,
the nominative case of the word meaning VEIN is composed entirely of ambiguous
and common letters when printed in Cyrillic (i.e., BEHA) and is therefore
phonologically bivalent. In Roman, by contrast, it comprises unique and
common letters (i.e., VENA) and is, therefore, phonologically unequivocal.
Importantly, in the dative case, neither alphabet rendition is bivalent
because the inflectional affixes for words of its class are the phonemes /u/
and /i/, both of which are represented by a unique letter in each alphabet,
although the base morpheme of the Cyrillic form (i.e., BEH) is still bivalent.

The major outcome of that experiment was a significant interaction of
alphabet and case. The difference in latency between dative nouns presented
in Cyrillic and Roman was -28 ms which was not significant, whereas the
difference between nominative nouns was 304 ms, which was significant. In
that dative nouns always included a unique letter, it appears that the effects
of phonological bivalence do not occur if letter strings composed of ambiguous
and common characters contain even one unique character. Importantly, in that
experiment, the unique character always constituted an inflectional morpheme.
Stated in terms of morphological units, the outcome of that experiment was
that an inflectional affix composed of a unique character and appended to a
bivalent base morpheme canceled the detriment due to ambiguity. Evidently,
the reader could use the alphabet designation of the inflectional affix to
assign a reading to the base morpheme. In conclusion, bivalence defined on
the word but not on the base morpheme alone slowed performance on a lexical
decision task. This outcome indicates that lexical access of inflected nouns
is not restricted to information in the base morpheme unit. Rather, it
encompasses the entire word.

An alternative perspective on a reader's appreciation of morphology
assumes that lexical entries are accessed from whole word units and that the
principle of organization among lexical entries or the lexical representations
themselves capture morphological structure. The final experiment (Feldman &
Moskovljević, in press) exploits the complex derivational morphology of
Serbo-Croatian to provide further evidence that whereas the morphological
structure of words is accessible to the skilled reader, lexical entries are
not accessed from base morphemes. The experiment incorporated a comparison
of three types of nouns all in nominative case: (1) base forms (e.g., STAN,
KORA); (2) the diminutive form of those same nouns, which as described above,
is formed (productively) by adding one of the suffixes ČIC, ICA, ENCE, AK to
the base form (e.g., STANČIC, KORICA), where choice of suffix is constrained
by gender of the noun, and (3) an unrelated monomorphemic word whose
construction inappropriately suggests that it contains the same base form and
a diminutive affix (e.g., STANICA, KORAK). The latter are referred to as
pseudodiminutive nouns. The examples mean "station" and "step," respectively.

The experimental design was a variation on the primed lexical decision
task borrowed from Stanners and his colleagues (Stanners, Neiser, Herron, &
Hall, 1979) and known as repetition priming. In the present adaptation of
the task, base forms appeared as target words preceded 7 to 13 items earlier in
the list by a prime that was either the identical word again in its base form, its diminutive or a pseudodiminutive form. Decision latency to the target as a function of which type of prime preceded it was examined. In addition, decision latencies to the first presentation of the word in its base, diminutive, and pseudodiminutive forms were compared. Results are summarized in Table 4.

<table>
<thead>
<tr>
<th>PRIME</th>
<th>TARGET</th>
<th>TYPE OF PRIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAN</td>
<td>610</td>
<td>STAN 563</td>
</tr>
<tr>
<td>STANČić</td>
<td>754</td>
<td>STAN 585</td>
</tr>
<tr>
<td>STANICA</td>
<td>718</td>
<td>STAN 609</td>
</tr>
</tbody>
</table>

From Feldman and Moskovljević (in press)

Decision latencies on primes were fastest for base forms, followed by pseudodiminutives and lastly, diminutives. The pattern corresponded with that predicted by frequency and provided no evidence that monomorphemic pseudodiminutive forms were slowed by an inappropriate parsing of morphemic structure. In addition, latencies for base and diminutive forms correlated significantly and neither correlated with pseudodiminutive forms. An examination of target latencies provided further evidence that pseudodiminutive words are not associated with an inappropriate base morpheme (and affix), whereas true morphological relationships are appreciated. Decision latencies to target words that were preceded by pseudodiminutive words were as slow as target words presented for the first time. In contrast, both base word and diminutive primes significantly reduced target decision latencies. In summary, results in the repetition priming variation of lexical decision showed significant facilitation for morphological relatives and no facilitation for unrelated pseudodiminutive words. In light of the claim that semantic relatedness of prime to target does not facilitate target decision latencies at lags as long as those introduced in the present task (Dannebring & Briand, 1982; Henderson, Wallis, & Knight, 1984), the foregoing results are interpreted as morphological in nature. In conclusion, the present experiment showed that the skilled reader of Serbo-Croatian is sensitive to morphological structure as evidenced by the results in repetition priming, but offered no evidence that morphological analysis entails decomposition to a base morpheme prior to lexical access.

In summary, an examination of results from lexical decision and naming tasks that take advantage of the bi-alphabetic condition in Serbo-Croatian provides evidence that skilled reading in Serbo-Croatian proceeds with reference to phonology. Specifically: 1) Skilled readers are slowed when a letter string is phonologically bivalent relative to when it is phonologically unequivocal. 2) The alphabet congruency of a prior-occurring associate can
speed decision latencies for phonologically bivalent (but not unequivocal) words. Moreover, it appears that phonological bivalence is defined on the entire word, not in the base morpheme alone, which suggests that 3) Skilled readers do not attempt lexical access from an isolated base morpheme. Concurrently, they consider its affix. Failure to find evidence that base morphemes are the units for lexical access should not be construed as a claim against morphological analysis by the reader, however. The results from repetition priming indicate that prior presentation of a morphological relative but not of a visually similar word facilitates decision latency to a target. The foregoing results support the claim that the skilled reader of Serbo-Croatian analyzes words both phonologically and morphologically.

References


Footnotes

1The introduction of two alphabets into Yugoslavia reflects the influence of the Orthodox Church in the Eastern regions and the Catholic Church in the Western regions. The Cyrillic script is probably an adaptation of the Greek uncial alphabet of the 9th century A.D. and the Roman script is a variation of the Latin alphabet, which was also derived from the Greek, probably via Etruscan (Diringer, 1948). In both cases, the scripts had to be adjusted to represent sounds not present in the Greek language and several mechanisms have been identified: 1) Combining two or more characters to represent a single phoneme such as DZ and, arguably, LJ and NJ; 2) Adding a diacritical mark to an existing letter to form a new letter such as Č, Ć, Š. The creation of new letters by inclusion of a diacritic is particularly prevalent in the adaptation of Roman script to languages whose repertoire of phonemes differs greatly from the Latin. Palatal-alveolar fricatives and affricates are represented in this fashion in many Slavic languages, including Serbo-Croatian (Wellisch, 1978); 3) Taking an existing symbol that was not used in the new language to represent a phoneme not present (or represented by multiple symbols) in the old language. For example, Roman C became /ts/ and Roman K remained /k/; 4) Borrowing characters from other scripts. Insofar as particular adaptations were made independently in each alphabet and the shape of some letters (e.g., D,Š,R) were modified slightly in the transition to Latin (Diringer, 1948), the intersection of the two alphabet sets represents a complex of factors.

2One consequence of the consistent mapping of grapheme to phoneme is that many dialectal variations are represented in writing such that spelling as well as pronunciation can vary from region to region. For example, the word that means MILK is MLEJKO in the dialects near Belgrade and is MLIKO in dialects along the Dalmatian Coast. It is important to note that the orthography fully specifies segmental phonology but that accent (rising/falling; long/short) is not represented. While vowel accent may differentiate between two semantic interpretations of a written letter string, this distinction is often ignored, however, especially in the dialects of the larger cities (Magnier & Matejka, 1971).
By law, all elementary school students must demonstrate competence to read and write in both alphabets. With the exception of liturgical text, which is relatively uncommon, the choice of alphabet is not systematic across genres of printed material. Therefore, it can be assumed that the Roman and Cyrillic forms of a word are equally familiar to the skilled reader.

In naming, however, more familiar words showed smaller effects of phonological ambiguity (Feldman, 1981). Analogous to claims made from studies with English materials (Seidenberg, 1985; Stanovich & Bauer, 1978), those words that are recognized more slowly and are presumably less familiar are more susceptible to phonological effects in a naming task than are less-familiar words.