A prototype theory of rhyme: Evidence from Hebrew

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Abstract

The aim of this study is to describe and test a prototype theory of rhyme in adult speakers of Hebrew. The prototype theory of categorization offers a model for describing the underlying structure of the category of rhyme. Within the prototype theory of rhyme proposed here, centrality to the prototype is determined by the following Rhyme Centrality Principle (RCP): Maximal resemblance in a minimally contrasting pair. This model was tested in the framework of Hebrew, a morphologically rich language with a variety of sources of rhymes. 30 native Hebrew-speaking subjects were asked to grade 4 lists of word pairs on a scale of 1–15 according to the quality of the rhyme. The design of the test was partially based on Hrushovski's (1971) literary study of rhyming methods in Hebrew poetry, extended to include a number of morphophonological classes that frequently occur in Hebrew songs and verse. The results show significant agreement among the subjects on ranking of the word-pair sets, and provide support for the existence of a category of rhyme with more and less prototypical members.

Keywords: rhyme; prototyep/periphery; optimality; phonology; morphology.

1. Introduction

The aim of this study is to describe and test a prototype theory of rhyme in adult speakers of Hebrew. This empirical research of rhyme evaluation analyzes the specific contents of the category of rhyme as graded and scalar, and the factors that contribute to speaker's evaluation of rhyming pairs as closer to or further away from the prototypical concept of "rhyme". The study connects phonology and morphology with a cognitive linguistics approach, and is based on the position that all manifestations of language use should be investigated (Langacker 1987).
1.1. The context of the study

The prosodic phenomenon of rhyme is based on the syllable and associated with meter—the rhythmic alternation of stressed and unstressed syllables (Gil 1986), both of which are known to be central in early speech (Kent 1992, Macken 1995). Peters' (1985) analysis of speech in the linguistic development of infants suggests that they focus on perceptually salient features such as rhythmic patterning, intonation contours, stressed segments and repetition—all of which function in rhymes.

Rhyme has been the subject of considerable interest in developmental psycholinguistics. Sensitivity to rhyme and rhythm is an early metaphonological ability which appears to emerge independently of formal literacy (Bryant, MacLean, and Bradley 1990, Grunwell 1986, Morais et al. 1987). Rhymes constitute the most frequently used phonological device in poems produced by children as young as 3 years in both English and Italian (Dowker 1989, Dowker and Pinto 1993). Studies have pointed at a clear connection between children's ability to detect rhyme and alliteration and later abilities in reading and writing (e.g., Bradley and Bryant 1985, Bryant, MacLean, Bradley, and Crossland 1990, Goswami and Bryant 1990). Two key findings emerge from these studies. First, they suggest that the ability to perceive, detect and enjoy rhyme is different from and in some sense more basic than other metaphonological abilities (Dowker 1989, Lenel and Cantor 1981, Morais et al. 1987). Second, there is strong evidence for the psychological reality of syllables and that onset and rime constitute cohesive intrasyllabic units for children as well as for adults (Adams 1990, Kirtley et al. 1989, Tolchinsky-Landsmann et al. 1995).

Rhythm and meter are well-known poetic traits (Hrushovski 1960). That rhyme has psychological reality can be seen within adult populations working with literary texts. In a recent study which looked at the integration of phonetic and graphic information in poetic text categorization judgments, adult literary students were found to be very sensitive to variations in rhyme and alliteration (Hanauer 1996). In addition, adults reported using rhyme as a central element in the categorization of poetic texts leading to high degrees of agreement between populations as to the categorization of this type of text (Hanauer 1995).

Rhyme is thus revealed to be an early and basic metaphonological device which can be observed in children (and in illiterate adults) well before the onset of literacy and the more sophisticated phonological awareness associated with it. Further, rhyme is structured by phonological units to which speakers are sensitive from early on. In addition, adults have been seen to be sensitive to rhyme and have knowledge of its strategic use in reading specific texts. It thus relates "purely" linguistic notions such as prosody and phonological constructs with "creative" or "poetic" aspects of language use, on the one hand, and developmental and psycholinguistic capacities on the other, it involves various aspects of a language user's ability to construe a linguistic structure in alternate ways (Langacker 1987, Tabukowska 1993).

1.2. A prototype theory of rhyme

Rhyme is a way of categorizing correspondences between linguistic segments (Bradley 1992, Leech 1969). As such, rhyme can be considered a category of structural resemblance between two (or more) forms. This category is one among a set of categories which define structural resemblance between forms, such as alliteration and a derivational word-family. Previous treatments of rhyme have been situated within the disciplines of linguistics and literature, and have been applied in models of emergent literacy (Bradley and Bryant 1985). To date, cognitively based theories of rhyme have not been proposed. The prototype theory of categorization offers a model that can describe the underlying structure of the category of rhyme.

Prototype theory (Lakoff 1987, Rosch 1978, Taylor 1989) posits that a category is structured according to the degree of centrality of its members, so that in any category there are more and less central members. Two notions underlie prototypical categories: family resemblance and contrast set. At the center of the category is a core of prototypical members which share the highest number of most salient features of the family and instantiate the prototype. A prototypical member is thus both a "best example" of the category, as well as having a minimum number of attributes shared with members of other categories. The category members are distributed along a continuum from the least to the most central. Some categories have clear boundaries, while others have fuzzy boundaries.

Rhyme is a type of similarity based on structural resemblance between two (or more) forms. The members of this category are not the forms but rather the resemblances between them. For example, best and rest form a rhyming pair. Each by itself cannot be considered a rhyme; it is the relationship of similarity between them that is the member of the category. Structural similarity can manifest itself on a continuum from purely phonological to a morphophonologically based resemblance. These linguistic levels form a continuum of structural resemblance that, in general, constitutes the context for the category of rhyme.

The basic unit of prosodic phonological description crucially relevant to the discussion of rhyme is the syllable, defined as consonants and vowels grouped into peaks of sonority or intrinsic loudness. Within optimality theory, syllable licensing posits that all words are composed of syllables
and that syllables are linguistic constructs rather than simply a consequence of physiology (Hammond 1997). A syllable contains zero or more consonants, a sonorous peak, and zero or more consonants (Clements and Keyser 1983). It is organized hierarchically in levels or tiers, posited for both prosodic and melodic or segmental units: segments are associated with C or V skeletal positions or slots, and are then grouped into syllables containing two major parts, the onset and the rime. A universal constraint, ONSET, requires that each syllable begin with a consonant (Hammond 1989). The onset node dominates the pre-vocalic consonant(s) (e.g., node that dominates the nucleus, an intervening the vowel (in the case of speak, the high tense vowel i). The rime also dominates any postnuclear consonant(s), termed coda, e.g., k in speak. Though there is a universal preference for syllables not to end with a consonant (the NoCODA constraint), violation of this constraint is tolerated within EVAL, the preferred language-specific ranking of the universal set of constraints on syllable structure (Archangeli 1997). Prosodic phenomena such as stress and tone assignment and the insertion and deletion of consonants and vowels universally find their natural domain within the rime (Goldsmith 1990, McCarthy and Prince 1990).

The specific attribute of rhyme in contrast to other categories of structural similarity, is that the site of the resemblance is the syllabic core, or the rime, of the syllable carrying the main stress of the word. For example, back and crack share the stressed rime /ak/ and the coda /k/. In alliterating pairs, in contrast, the site of resemblance is the onset consonant of the syllable, e.g.,

...cloudless climes and starry skies
(Byron, *She Walks in Beauty*).

Sharing this syllabic core is the necessary condition without which the structural resemblance between a pair of words cannot be considered a rhyme. This determines the cutoff point of the category of rhyme: pairs of words that do not share the same stressed rime cannot be considered members of the category.

A central concern in a definition of the structure of any category is what determines membership in the prototypical core, and, by extension, what characterizes more peripheral members. Two essential factors in defining the central members of the category of rhyme are resemblance and contrast. Since the category of rhyme consists of resemblance between pairs of words, total resemblance could only result in the repetition of the same word. Thus a degree of contrast is necessary in order to create a rhyme. For example, in the monosyllabic pair best and rest, the rime vowel and coda consonants are identical, while the onset consonants constitute the contrast. In the Hebrew pair zikaron ‘memory’ and aron ‘cupboard’ the resemblance resides in all members of the stressed syllable ron, while the rest of the syllables are different.

1.2.1. The rhyme centrality principle. Prototypicality is determined by the ratio of resemblance to contrast between words. Within the prototype theory of rhyme proposed here, centrality to the prototype is determined by the following rhyme centrality principle (RCP): Maximal resemblance in a minimally contrasting pair. Minimal contrast can be achieved through dissimilarity of a single noncoda consonant or an unstressed vowel in the rhyming pair either within syllabic boundaries or outside them. However, there is a preference for nesting the contrast either within a non-simpler monosyllable or in a complex intrasyllabic structure within the word.

The simplest syllable structure within which contrast can be achieved consists of the optimal syllable CV—a single onset consonant and a single rime vowel (e.g., be and me). Such a rhyming pair would have 50 percent similarity in the vowels and 50 percent contrast in the consonants. This equal distribution of resemblance and contrast violates the requirement of the rhyme centrality principle for minimal contrast and maximal resemblance, and explains the preference for a more complex syllabic structure. According to this, the rhyming pair seek and seek with an identical stressed vowel and coda consonant would be considered more central than be and me because there is a higher proportion of resemblance in relation to contrast.

The requirement for minimal contrast and maximal resemblance can be fulfilled beyond the boundaries of the single syllable, within the (minimally bimorphemic) word. In this case, a prototypical rhyme is achieved by resemblance between as many syllables as possible following and including the stressed syllable, and contrast between as few syllables as possible preceding the stress. For example, the rhyming pair subordinate and coordinate share the stressed syllable and the two following syllables, and the contrast resides in the initial pre-stress syllable. From the point of view of the rhyme centrality principle, this pair of rhyming words would be considered prototypical.

1.2.2. The proposed structure of the rhyme category. Table 1 expresses in notational form the structure of the rhyme category according to the rhyme centrality principle. The category includes a central core, three peripheral levels, and a cutoff point. The working unit, designated by ‘U’, indicates either a syllable or a syllabic element. Thus, ‘U’ may represent a syllable, a consonant or a vowel. The notation ‘U’ stands for a stress unit, either a stressed rime within a single syllable, or the stressed syllable itself in the word. The notation ‘+’ stands for a word-final
boundary. Unit "U_{0.5}" is the pre-stress unit; "U" is the stress unit; and "U_{0.5.0}" is the post-stress unit. The notation E\_N refers to the number of elements of the pre-stress and post-stress unit. In a monosyllabic word, the pre-stress and post-stress units are the possible onset and coda consonants; in a bi- or multisyllabic word, they stand for possible syllables.

Let us consider a number of examples illustrating the prototypical and peripheral members of the rhyme category. For the reasons explained above, the central core is restricted to non-simples members which fulfill the requirements for rhyme centrality. These can either be a monosyllabic pair with at least a CVC construction so as to leave room for a minimal contrast, e.g., leap/klep, blowlow, scream/stream; or a bi- to multisyllabic pair, e.g., sonnet/bonnet, marking/barking, with the minimal contrast a single consonant in the pre-stress syllable(s). In cases with identical stress and post-stress syllables, minimal contrast can be expressed in totally differing pre-stress syllables, e.g., subordinateliminate. We posit three peripheral rhyme levels characterized by increasing distance from the prototype, which has different manifestation for the three components of the rhyme. Levels I–II refer to increasing contrast in the pre-stress and stress units. Peripheral rhyme, Level I refers to a phonologically complex word with more than one syllable, and more than minimal contrast in the pre-stress unit, e.g., express/impress, classify/specify. Alternatively, the stress syllable itself may display less than maximal identity, while the pre-stress unit may be identical, e.g., surprise/sunrise. A combination of the two yields Level II peripheral rhyme, e.g., suggest/request, with more than minimal contrast in the pre-stress unit (which is completely different), and less than maximum possible resemblance in the stress unit. The already mentioned example of a monosyllabic CV (belme) with too small a site for proper resemblance belongs here. Level III concerns the post-stress rather than pre-stress unit(s). Violation of the requirement for identity here would result in a Level III rhyme, e.g., cushion/pushing. A non-rhyme would consist of non-matching stress units (e.g., vomit/permit) or of totally different stress units: pair/look.

2. The interface of morphophonology and rhyme in Hebrew

Rhyming is usually regarded as a purely prosodic/phonological phenomenon. However, many of the English examples given rhyme because of their morphophonological structure, specifically the stress pattern and the derivational suffix (e.g., classify/specify). The present study focuses on Hebrew, a language rich in morphological constructions and morphophonological phenomena. Our aim is to test the rhyme centrality principle in a Hebrew context, given Hebrew morphophonological structure.
2.1. Sources of rhyme in Hebrew

Rhythms are created in Hebrew at both the purely phonetic as well as the morphonological level for both inflected and derived words. Over and above rhyming between basic monomorphemic words like mar ‘bitter’/axbar ‘mice’, most rhyming syllables in Hebrew words mainly derive from two sources. One is a syllable which results from the combination of segments from the nonlinear combination of a Semitic consonantal root and a (mainly) vocalic pattern, e.g., gadol ‘big’. root g-d-l, and sagol ‘purple’, root s-g-l, both taking the adjective pattern CaCoC. In fact, certain categories of Hebrew rhyming derive essentially from the very existence of morphological patterns: pattern CaCoC, designating agent nouns and adjectives, creates rhyming words, especially if their roots share a final consonant, e.g., sakran ‘curious’/safran ‘librarian’ (Berman 1987, Ravid 1990).

Another morphology-driven rhyme type in Hebrew is similar to the English examples used above: from the concatenation of segments from a stem (which contains vowels, unlike a Semitic root) and a suffix, e.g., strasrot ‘boat’/boats, birabrot ‘capital’/capitals with the feminine plural suffix -ot. Hebrew words take a variety of lexical and grammatical suffixes, e.g., genitive third person singular -a in mel-o ‘his coat’ (lit. ‘coat-his’), or abstract -it as in kri-sit ‘coolness’. The suffix may either constitute a syllable (e.g., past-tense first person singular -ti), or syllabifies when the initial vowel combines with the final consonant of the stem to create a new syllable, in which the suffix constitutes the sonorant core and sometimes also the coda, as in sirot ‘boats’. The rhyming pair is formed through the syllables created by the last stem consonant and the suffix. The wide range of suffixes and the variety of linguistic functions that they fulfill make it extremely easy for Hebrew speakers to form rhymes: almost every pair of similarly inflected or derived words share a rhyming suffix (Tsur 1976). And in fact observation indicates that grammatical rhymes occur frequently in popular songs and rhymed recitations.

In Hrushovski’s (1971) analysis, a “morphological norm” plays a role in Hebrew rhyming patterns: if the rhyme arises because of similarity in grammatical suffix (e.g., plural suffix -im in al-immarsh-im ‘leaf’/leaves, ‘allow’/allow [plural]) then the rhyming pair must share at least one (presufical) root consonant to be considered a “good” rhyme. However, if the ending is not part of a grammatical suffix, then this requirement is automatically met. This is the case in the homophonous pair alimmarshim ‘violent’/impressive; the -im ending is part of the internal morphological structure of the rhyming words (root 7-l-m, pattern CoCIC vs. root r-sh-m, pattern maCIC) rather than a separate plural suffix. Empirical investigation should reveal whether Hebrew speakers indeed regard rhymes that violate this morphological norm as inferior to those that do not.

2.2. Stress and rhyme in Hebrew

Following the ROOTING constraint, all words must bear stress, assigned to syllables. Syllables are arranged by alternating stressless/stressed patterns (feet) within the word (Hammond 1997). Studies concerning rhyme, whether as a literary device or as a measure of metaphoronomological abilities, note the centrality of stress patterns in the formation of a rhyming pair (Leech 1969). Hebrew stress patterns interact with this general requirement in a specific way. Native content words in Hebrew are assigned one of two stress patterns: word-final (e.g., tipa ‘drop’, gsharon ‘bridge’, limul ‘study’) and penultimate (e.g., gesh ‘bridge’, hiklita [she] ‘record’, na’alut ‘I (fell)’ (Bolozy 1997). The edges of these prosodic patterns are aligned with nonlinear meaning-carrying patterns and linear suffixes (Russel 1997), resulting in di- and trisyllabic native content words in Hebrew. Optimal dissyllabic words with a iambic pattern result from root-and-pattern combinations (e.g., migdal ‘tower’ from root g-d-l ‘big’ and the ultimately stressed place pattern miCaC) or from the concatenation of a stressed suffix with a stem (e.g., mappit ‘napkin’, from mapa ‘tablecloth’ and diminutive suffix -it). Optimal dissyllabic words with a trochaic pattern result from the application of penultimately stressed CoCoC and CoCeC patterns to roots (e.g., lexem ‘bread’) (Genesius 1910). Trisyllabic words usually result from the application of nonlinear patterns aligned with these two prosodic patterns to roots (e.g., misgeret ‘framework’ from root s-g-r ‘close’ and abstract pattern miCeCer), or from the concatenation of stressed and unstressed suffixes to stems (e.g., na’alut ‘fell’ results from attaching the unstressed first person singular suffix -it to the past tense stem naflal ‘fell’).

Since the creation of a rhyme depends on both syllable structure as well as on stress placement, rhyming in Hebrew is related to these major stress patterns. If the rhyming pair carries word-final stress—traditionally, a “masculine” rhyme (Hrushovski 1971, Leech 1969), the minimal requirement for rhyming is that the final syllables of both words share segments, e.g., xutsaltsita ‘shirt’/meatball or tisiotmakor ‘horse’/beak; but if the two words take penultimate stress (a “feminine” rhyme) in order to rhyme they must share phonetic segments in both final syllables from the stress-carrying rime onwards—the stress carrier as well as the final non-stressed syllable, e.g., masbaret/mikkeret ‘notebook’/pipe or baki/ziyyut ‘house’/olive’. Our study examines how Hebrew speakers construe these two main classes of rhymes.
3. The rhyme centrality principle in a Hebrew perspective: The study

In order to examine Hebrew speakers' evaluation of types of rhymes, we designed a test with 15 categories of rhymes, which adult subjects were asked to grade on a scale of 1–15. The design of the test and the analysis of rhyme types (see Appendix 1) are partially based on Hrusovski's (1971) literary study of rhyming methods in Hebrew poetry, extended to include a number of morphophonological classes that frequently occur in songs and verse. Given the two options of stress in native Hebrew words—ultimate and penultimate—our test contains rhymes in two basic or classical groups: Set A contains so-called "masculine" (ultimate stress) rhymes and Set B contains "feminine" (penultimate stress) rhymes. In addition to these two classical groups, there are two more groups: Set C, containing grammatical rhymes based on grammatical suffixes, and Set D, modernistic rhymes. We added to these Set E: a group with contrasting stress, and a group of non-rhymes. A detailed list of the structure of Hebrew rhyming sets is given in Appendix 1. Appendix 2 presents the rhyme test, and Appendix III the rhyme pairs by categories. We will now apply the rhyme centrality principle to motivate this classification on the scalar model of rhyme. The names of categories are taken from Hrusovski (1971). All phonetically transcribed words are ultimately stressed unless marked differently.

Set A: 1.1–1.3. Classical ultimately stressed ("masculine") rhymes. This set of word-pairs contains three subsets with ultimate stress: one group ending with an open vowel (1.1), and two groups ending with closed syllable (1.2 and 1.3). Category 1.1 (precise masculine, no coda) is high Level I, with two syllables, the second of which is identical within the pair (e.g., barisahkri 'healthy/false'). What should be a corresponding open-syllable (nonprecise masculine) rhyme belongs further down the list, as it can usually derive only from grammatical suffixation. Category 1.2 (precise masculine plus coda) has the same location (e.g., mersaktsaxak 'distance/laughed'), and the only difference is that the last syllable has a coda. Subset 1.3 (nonprecise masculine plus coda) is low Level I, since not only does it not share a pre-stress syllable within the pair, it also has contrast within the stress syllable (gilmaxta 'age'/starting').

Set B: 1.4–1.6. Classical penultimately stressed ("feminine") rhymes. This set of word pairs also contains three subsets, with penultimate stress: one group ending with an open vowel (1.5), and two groups ending with closed syllable (1.4 and 1.6). Group 1.4 (precise feminine plus coda) is Central, with the word pair identical in the stressed and post-stress syllable. The only difference is in the absence of a pre-stress syllable in one of the members of the pair, or a single onset contrast when it exists (e.g., shalēxet/holēxet 'fall/walking' [Feminine]). 1.5 (nonprecise feminine, no coda) is Central too, with total identity except for the necessary contrast either in the onset of the stressed syllable or in the existence of a pre-stress syllable in one of the members (e.g., rēgalēga 'minute/'hindrance'). Subset 1.6 (nonprecise feminine plus coda) is again Central (e.g., ḥayyiyya/kayyiyya 'house/olive'). It differs from group 1.4 in that the stressed syllable contains a contrasting onset consonant.

Set C: 2.1–2.3. Grammatical rhymes: ultimate stress. This set derives from Hebrew morphological structure, contains the missing masculine open syllable subset, and adds another, more peripheral closed syllable subset. Subset 2.1 (a-suffix) is Level II. The word pair differs in everything except for the Hebrew feminine suffix -a (e.g., stimayalda 'filling/girl'). Group 2.2 (e-suffix) is also Level II. Here the word pair differs in everything except the corresponding masculine suffix -e (e.g., yifnefale 'will-turn/p-eeble'). Subset 2.3 (Plural suffix -im) is a very popular rhyme type among inexperienced rhymers. The last two components of the stress syllable (the vowel and the coda) are identical and the onset constitutes the contrast. Since this set has exactly the same phonological structure as 1.3, it should be assigned to Level I, low.

Set D: 3.1–3.4. Modernistic rhymes: ultimate and penultimate stress. This set contains rhymes with the two Hebrew stress patterns—ultimate and penultimate—which differ in their codas. Subset 3.1 (incomplete rhyme—voiced vs. voiceless coda) is located at Level III, high. This set resembles 1.2 and 1.4; however, the coda consonant has a different voice value (e.g., harag/mara'ak 'killed/soup'). Category 3.2 (incomplete rhyme—open vs. closed syllable) can be assigned to Level III, middle. The pre-stress syllable is identical in vowel, and the stressed syllable is identical, except for the contrasting element which is the lack of coda in one of the word-pair members (e.g., torem/more 'donator/teacher'). Subset 3.3 (incomplete rhyme—penultimate stress; closed syllable) is at Level III, low. This rhyme set resembles 1.4, with total resemblance from the stressed syllable onwards, as the post-stress syllable ends with a contrasting coda (e.g., xōshex/nexōshet 'darkness/copper'). Group 3.4 (incomplete rhyme, penultimate stress; closed vs. open syllable, non-identical vowel) is Level III, low. The post-stress syllable in the word pairs differs either in vowel, or in both vowel and presence of coda (e.g., šalēxet/alēx ‘to go/on you' [Masculine Singular]).
Set E: Non-rhyme. This set contains two groups, which violate the basic requirements of rhyming. One is 4.0 (contrasting stress), where the word pairs do not share the same stressed syllable although it is identical in its composition (e.g., ṣeveliḳoṿel ‘garbage’/binding’). The second group is 5.0 (non-rhyme), with completely different words (e.g., me’illaron ‘coat’/cupboard’).

3.1. Method

Subjects. Thirty native Hebrew speaking subjects took part in this study. All subjects were female and their ages ranged from 21 to 25. All subjects were students in the Department of Communication Disorders at Tel Aviv University. None of the students had received formal instruction in Hebrew grammar or held degrees in Hebrew linguistics or literature.

Materials. Four lists of 15 word pairs were constructed in the categories of rhyme presented in the preceding section and in Appendices 1, 2, and 3, as follows:

Test Categories

(1) Classical rhyme
   1.1 Precise “masculine” rhyme—open syllable
   1.2 Precise “masculine” rhyme—closed syllable
   1.3 Nonprecise “masculine” rhyme—closed syllable
   1.4 Precise “feminine” rhyme—closed syllable
   1.5 Nonprecise “feminine” rhyme—open syllable
   1.6 Nonprecise “feminine” rhyme—closed syllable
(2) Grammatical rhyme
   2.1 Feminine suffix—open syllable
   2.2 Masculine suffix—open syllable
   2.3 Plural suffix—closed syllable
(3) Modernistic rhyme
   3.1 Incomplete rhyme; voiced vs. voiceless coda
   3.2 Incomplete “masculine” rhyme; open syllable vs. closed syllable
   3.3 Incomplete “feminine” rhyme; closed syllable
   3.4 Incomplete “feminine” rhyme; closed vs. open syllable, non-identical vowel
(4) 4.0 Contrasting stress. “Feminine” vs. “masculine” rhyme
(5) 5.0 Non-rhyme. No phonetic similarity between segments.

All materials were presented in fully vocalized Hebrew orthography. The four lists of word pairs were identical in composition by each category, but each of the four lists consisted of different specific items. Thus the four lists involve four specific manifestations of the overall category scheme (See Appendices 1-3 for detailed lists of the materials).

Task. The subjects were required to fulfill the following tasks:

a. Read through the full list of 15 pairs of words.

b. Rank the 15 pairs according to the quality of the rhyme as perceived by the subject.

The thirty subjects were tested in two groups of fifteen. Each subject was presented with a booklet that consisted of a page of general instructions and four separate pages each with a separate list of 15 word pairs. Materials were prepared in three different random orders for each of the word pairs for each list and in two different random orders of lists. The different versions of stimulus items were randomly distributed among the subjects. Each subject was asked to give a rank order score next to each of the word pairs on each of the lists according to how they ranked the quality of the rhyme. Following the completion of each single list, the subjects were instructed to go to the next list. Subjects were instructed not to return or change any of the rank order scores for the word pairs on that list once they had completed it. The same instructions were given for each of the four word lists.

4. Results

The participants in this study ranked four sets of word pairs according to quality of rhyme. The central issue of interest in this study is the structure of the category of rhyme that is reflected in the participants’ judgments. In order to explore this issue, the following statistical testing strategy was employed:

1. Initially Kendall’s coefficient of concordance, \( W \), was calculated for each individual participant’s ranking for each of the word sets. This test evaluates the degree of agreement among the participants on the rank order of the word pairs in each of the word-pair sets. Significant agreement shows that the participants were ranking the word pairs in the same way in each of the word-pair sets.

2. Following the test of agreement among participants for each of the word-pair lists, a Spearman rho rank order correlation was calculated to test the similarity among the group rank orders among all four word-pair sets. Significant positive rank order correlations among the
word-pair sets shows that the word pairs were ranked in a similar way by the group in each of the word-pair sets.

3. Finally, a hierarchical cluster analysis using the group rank orders of the word pairs as data and the original rhyme categories as variables was calculated. If significant agreement is found among the individual participants for each of the word-pair sets and among the group rank orders on all four word-pair sets, the results of hierarchical cluster analysis allow the discussion of the underlying structure of the category of rhyme.

4.1. Kendall’s coefficient of concordance W

In order to test the agreement among participants on the rankings of fifteen word pairs in each of the four sets, Kendall’s coefficient of concordance $W$ was calculated. Table 2 shows the results of this test for all four word-pair sets. As can be seen in Table 2, there was a high degree of agreement among all the participants on the rank order of the word pairs for all four word-pair sets. The coefficient of concordance $W$ was significant at the 0.001 level for all the word-pair sets. These results show that there was agreement among the participants as to the ranking of the word pairs for each of the four word lists and suggests that the participants were using a similar scale of rhyme.

4.2. Spearman rho rank order correlations

Kendall’s coefficient of concordance $W$ calculated the degree of agreement on the ranking of word pairs among participants on four individual word-pair sets. This test does not tell us if there is any correlation between the rank ordering of rhyme categories among the four word-pair sets. In order to test the degree of association among the sets of word pairs, a Spearman rho rank order correlation was calculated. The results of this test are presented in Table 3. As can be seen in this table, the rank order correlations range from 0.81 to 0.91. All four word-pair sets were found to be significantly related at a 0.01 significance level for a nondirectional two-tailed test. These results show that the group rankings for all four word-pair sets were highly positively associated and suggest the existence of a common underlying scale of rhyme.

4.3. Hierarchical cluster analysis

The results of the previous two tests reveal agreement among participants as to the ranking of word pairs in each of the four word-pair sets and positive correlations among the four sets of word pairs as to the group ranking of each of the 15 categories of rhyme. These results suggest that some form of common scale for completing this task was shared by the participants of this study and that this scale was used for all four rhyme rank-order word-pair sets. However, the results presented so far do not reveal anything about the structure of this scale. In order to consider the structure of this scale of rhyme, a hierarchical cluster analysis using the group rank orders of the word pairs as data and the original rhyme categories as variables was calculated. The results of this analysis are presented visually in the hierarchical cluster analysis dendogram in Figure 1. As can be seen in the dendogram, the original Hebrew rhyme categories cluster into two main groupings:

1. Classical rhyme, consisting of precise masculine rhyme, open and closed syllables (1.1, 1.2), nonprecise feminine rhyme, open and closed syllables (1.5, 1.6), nonprecise masculine rhyme, closed syllable (1.3), and precise feminine rhyme, closed syllable (1.4).

2. Grammatical rhyme, consisting of feminine suffix, open syllable (2.1), masculine suffix, open syllable (2.2) and plural suffix, closed syllable (2.3); plus modernistic rhyme, consisting of incomplete rhyme, voiced and voiceless coda (3.1), incomplete masculine rhyme, open vs. closed syllable (3.2), incomplete feminine rhyme, closed syllable (3.3), incomplete feminine rhyme, closed vs. open syllable, non-identical
vowel (3.4); contrasting stress, consisting of feminine vs. masculine rhyme (4.0); and non-rhyme (5.0).

As seen in the dendogram, the second of these groupings was essentially formed from two smaller groupings—grammatical rhyme, modernistic rhyme (apart from incomplete feminine rhyme, closed vs. open syllable, non-identical rhyme, 3.4), and contrasting stress form one close cluster; non-rhyme and incomplete feminine rhyme, closed vs. open syllable, non-identical rhyme (3.4) form the other close cluster. Thus, the overall structure presented by the dendogram involves three groupings of rhyme categories: (i) classical rhyme; (ii) grammatical rhyme, modernistic rhyme, and contrasting stress; and (iii) non-rhyme and incomplete feminine rhyme, closed vs. open syllable, non-identical rhyme.

By considering the group rank-order positions for the rhyme categories presented in Table 4, it can be seen that the first grouping consisting of classical rhyme clusters around the top third of the rank-order scale. All the classical rhyme categories for all four word-pair sets are in positions from 1 to 6. This result suggests that the classical rhymes are the more prototypical rhymes. As can be seen in Table 4, the second grouping consisting of classical rhyme, grammatical rhyme, modernistic rhyme (apart from 3.4) and contrasting stress occupy the positions from 7 to 13 for all four word-pair sets. This result suggests that these rhyme categories are less prototypical than the classical rhymes. Finally the last grouping which is absolutely consistent across all four word-pair sets places the category of non-rhyme at the very bottom of the scale and the incomplete feminine, closed vs. open syllable, non-identical rhyme one place from last. This last grouping seems to involve the cut-off point of the category of rhyme.

5. Discussion: The underlying structure of the rhyme category

This article presents a prototype theory of rhyme categorization and tests it within the framework of Hebrew morphophonology. Thirty native Hebrew speakers were asked to rank four lists of 15 word pairs which consisted of five major rhyme categories constructed following Hrushovski (1971). The results show significant agreement among the subjects as to the ranking of the word-pair sets, and strongly support our hypothesis of the existence of a category of rhyme with more and less prototypical members.

5.1. The center

The prototypical core of the category (Center and Level I) is what is in Hebrew literary analysis traditionally called classical rhyme, which contains rhyming word pairs in the two native Hebrew stress
patterns: ultimate ("masculine") and penultimate ("feminine"). The core constitutes Set A (1.1–1.3) and Set B (1.4–1.6) of our test respectively, with subsets differing in the existence of a coda (1.1 and 1.5 had one, the others did not) and in the amount of resemblance between the words in the rhyming pair: "precise" word pairs (1.1, 1.2, 1.4) had more resemblance than "nonprecise" ones. Our prediction was that subsets 1.4–1.6, which display maximal resemblance and minimal contrast, would be judged as Center, while subsets 1.1–1.3, which allow more contrast in the pre-stress syllable, would be judged to be Center/Level I. The rank ordering and the cluster analysis suggest that Hebrew speakers evaluate such rhymes as best examples of rhymes, and that subset 1.3 (nonprecise "masculine") rhyme with a coda which has the most contrast within the stressed syllable itself is situated on the periphery of the central core.

As argued in the current article, Hebrew classical rhymes are central because they best fulfill the rhyme centrality principle which requires maximal resemblance in a minimally contrasting pair. The iambic "masculine" stress pattern in subsets 1.1 and 1.2 allowed all contrast to reside in the stressless first syllable, and left total identity to the stressed syllable, e.g., rofel/kafe ‘physician’/coffee’. Set 1.3 allowed contrast in the stressed syllable onset as well, resulting in a slightly less central site. The trochaic "feminine" stress pattern in 1.4–1.6 calls for more resemblance than the iamb: they are judged as central because resemblance spreads over both stressed and post-stress syllables from the peak to the right (e.g., děgel/ěgel ‘flag’/cell’). Even contrast in the onset of the stressed syllable does not lower the position of subsets 1.5–1.6, unlike subset 1.3, since the former allow for a broader resemblance site in the post-stress syllable, while the latter cannot, due to its stress pattern.

5.2. The periphery

The periphery of the category of rhyme (Levels II and III) consists of what was evaluated as a separate cluster in this test—grammatical rhymes (2.1–2.3), modernistic rhymes (3.1–3.3) and contrasting stress (4.0). It is here that we see the competitive ranking of universal constraints and Hebrew-specific morphophonological structure.

5.2.1. Grammatical rhymes. Grammatical rhymes, formed by syllabifying a root or stem suffix with a suffix that starts with a vowel, can be explained up to a certain extent on purely phonological grounds. Note that subsets 2.1 and 2.2 with -a and -e gender suffixes complement the missing subset after 1.3—what should have been a nonprecise "masculine" rhyme. They are not evaluated as central by our subjects because they violate the rhyme centrality principle by having a contrast/resemblance ratio which is too biased toward contrast: the only similar segment in simayalda is the final stressed vowel. In fact, the rhyme centrality principle favors exactly the kind of syllables that go counter the optimality theory constraint *COMPLEX which calls for simplex syllables in production and perception, the simplest of which is the optimal CV. Archangeli (1997) discusses the EVAL mechanism that selects the optimal output by ranking the viable constraints in a particular language. We suggest that selecting the optimal output may also be guided by an evaluation measure which takes into account other types of linguistic variation, such as register and genre, in which this output functions. For making rhymes, in contrast to unmarked perception/production, the more complex the stressed syllable, the better: the more resemblance in the peak and onward, the higher the evaluation of the rhyme, whereas the minimal structure of CV does not leave any room for resemblance beyond the vowel itself. This is in line with Slobin’s (1977) maxim of being rhetorically expressive in linguistic expression: rhyming is not an everyday phenomenon. It is used in marked linguistic circumstances such as poetry and verbal play, and is used for enjoyment and for artistic purposes. Rhyming draws the attention of the listener to the phonological components of the linguistic output, and requires metalinguistic awareness. Its marked phonological structure is a result of its marked function in language.

But a solely phonological framework cannot explain why subset 2.3, which has exactly the same syllabic structure as 1.3, is clustered together with the minimal-resemblance categories 2.1 and 2.2 (Figure 2), and ranked in the middle-to-low section of Table 4 whereas subset 1.3 clusters with 1.1–1.6 and is ranked sixth. The diagrammatic structure of the rhyming pairs in question is reproduced here from Appendix 1:

1.3 Nonprecise "masculine" rhyme: closed syllable, e.g., gillmaxil

2.3 Plural suffix—closed syllable, e.g., banint/kadurim

The rhyme centrality principle is satisfied to the same extent in both cases, but the resulting rhyme is evaluated differently by our subjects. The difference between categories 1.3 and 2.3 is morphological rather than...
phonological: the rhyming stressed syllable in 1.3 consists of root and pattern segments, whereas in 2.3 it is formed by syllabifying the last root consonant with the Hebrew plural suffix -im. As predicted by Hrushovski (1971), Hebrew speakers follow the morphological norm which requires that rhymes sharing a grammatical suffix also share a final root or stem consonant. In evaluating a rhyming pair, Hebrew speakers take into account the morphological function of its components, and use a different measure to evaluate word pairs sharing the same phonological structure and differing morphological functions. This result means that rhyming is more than a purely prosodic phenomenon, and that a theory of rhyme should take into account morphological in addition to phonological factors.

5.2.2. Modernistic rhymes. Figure 2 and Table 4 show incomplete or modernistic rhymes to cluster together with other peripheral rhyme categories. Modernistic rhymes violate the requirement that the rhyming pair share the post-stress coda. In subsets 3.1 and 3.2 the word pairs differ in the voice value or the existence of the coda on the final, stressed syllable; while in subset 3.3 the coda on the final post-stress syllable is different. The fact that these rhymes are evaluated as lesser in quality than classical rhymes indicates that resemblance should reside in the sonorous peak, which includes the possible coda. While different onsets are allowed and still leave the rhyme in the central core (e.g., 1.3), as long as enough resemblance resides in the peak and coda a contrast in coda devaluates the rhyme, even though the rest of the word pair from the stress onwards is essentially identical, as in 3.3, e.g., shēleg/kōsēlet. These results of the rhyme test thus provide evidence for the close link between the rime and the coda. Further evidence for this link is the rejection of subset 3.4 as a possible member of the rhyme category (e.g., helēn/hēlē/hēlē/xelē ‘shock’/ (they) started’ counter to our predictions. This type of rhyme, popular in Modern Hebrew poetry (Hrushovski 1971), involves the stress and the post-stress syllables. The resemblance resides in the vowel of the stressed syllable (the onset may differ), and in the onset of the post-stress syllable. The contrast is in the rime of the post-stress syllable: the vowel and the coda, if there is one. Hebrew speakers tolerate the contrast in coda in the rhyming pair, but not a contrast in the vowel, though it is not stressed. This seems to place the word pair beyond what Hebrew speakers consider as a “rhyme”.

5.2.3. Contrasting stress. Counter to our predictions, our subjects included word pairs with contrasting stress within the periphery of the rhyme category. Pairs such as xōref/soref ‘winter’/‘burning’ were evaluated in the same cluster with grammatical and modernistic rhymes. One reason for this may be that the test was given in written form: although all words were printed in fully vocalized script, stress is not overtly marked in writing. Therefore, subjects may have placed less focus on the stress pattern and more on the phonological segments represented by Hebrew orthography. Another reason may have been that the test was given in the form of isolated, non-text-bound word pairs, which again caused subjects to pay less attention to the stress contours. Anchoring possible rhymes within a poetic text, for example, may aid subjects to evaluate patterns of stress in rhymes within the stress contours of the intonation units that make up such a text.

6. Conclusion

This paper proposes and provides support for the prototype theory of rhyme, which constrains rhyme structure by the rhyme centrality principle: maximal resemblance in a minimally contrasting pair. The analysis of Hebrew-speaking subjects’ evaluations of word pairs shows that a basic requirement in the rhyme category is resemblance in the stressed syllable from the sonorous peak onwards. Central rhymes share this identical site and may differ in the onset of the stressed syllable or the pre-stress syllable. Contrast in the post-stress coda demotes the quality of the rhyme in the subjects’ evaluation. Hebrew morphophonology interacts with the rhyme centrality principle to constrain rhymes deriving from grammatical suffixation.

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Appendix 1: The structure of the rhyming sets

Set A—“masculine rhymes”—ultimate stress (i = identical; n = nonidentical)

1. Precise “masculine” rhyme—open syllable: Central/Level 1, e.g., barishkīn

2. Precise “masculine” rhyme—closed syllable: Central/Level 1, e.g., merxāk/tīxāk

3. Nonprecise “masculine” rhyme—closed syllable: Level 1, e.g., gīl/māxīl
Set B—"feminine rhymes"—penultimate stress

1.4 Precise "feminine" rhyme—closed syllable: Central, e.g., žalalelelelele

1.5 Nonprecise "feminine" rhyme—open syllable: Central, e.g., ržalapéga

1.6 Nonprecise "feminine" rhyme—closed syllable: Central, e.g., bilyižyiyit

Set C—grammatical rhymes—ultimate stress

2.1 Feminine -a suffix—open syllable: Level II, e.g., stinatyačča

2.2 Masculine -e suffix—open syllable: Level II, e.g., stinjelreče

2.3 Plural suffix—closed syllable: Level II, e.g., baničikadurim

Set D—modernistic rhymes

3.1 Incomplete rhyme, voiced vs. voiceless codas: Level III, e.g., haragmarak, yaxadutatkat

3.2 Incomplete rhyme, open vs. closed stressed syllable: Level III, e.g., toremore

Appendix 2: The rhyme test

List 1

(1) zarizmatris 'dexterous'/'defying'
(2) shurišamor 'bull'/'donkey'
(3) yeladimizim 'children'/'goats'
(4) tăyilidyis 'wire'/'flight'
(5) kamonitoni 'like me'/'poverty'
(6) nashikashit 'feminine'/'drinking straw'
(7) mešilaron 'coat'/'cupboard'
(8) năxalunukat 'complacency'/'lying down (feminine)'
(9) konelyisxe 'buying'/'will swim'
(10) landalshamra '(she) studied'/'(she) kept'
(11) ishitbereshit 'personally'/'Genesis'
(12) xatudpartsu 'they crossed'/'(they) burst out'
(13) la-luxeteté 'to-go-on-you'
(14) hiklihalkita '(she) recorded'/'protrusion'
(15) báyclczyi 'house'/'olive'
List 2
(1) zévell/kovel ‘garbage’/‘binding’
(2) xòshexinexischet ‘darkness’/‘copper’
(3) moomarishamur ‘spotted’/‘kept (adj.)’
(4) shmimirindminda ‘kept (adj., pl.)’/‘working (plural)’
(5) daxxat/katuf ‘urgent’/‘rude’
(6) liux/maiutax ‘board’/‘salty’
(7) gòválrov ‘height’/‘quarter’
(8) meshane/meule ‘changing’/‘excellent’
(9) jëxandmutsaxat ‘together’/‘successful (feminine)’
(10) toremi/more ‘contributor’/‘teacher’
(11) dégellégel ‘flag’/‘calf’
(12) shëtëtë-fèta ‘galloping’/‘suddenly’
(13) axrayat/xulta ‘responsibility’/‘shirt’
(14) barislhikri ‘healthy’/‘false’
(15) medinalisha ‘state’/‘woman’

List 3
(1) yifne/rafie ‘will turn’/‘fleeble’
(2) motsi/holóxax ‘stretching (feminine)’/‘sending (feminine)’
(3) këles/mistader ‘dog’/‘managing’
(4) ràxashilfraxat ‘rustle’/‘blossom’
(5) merzalkotaxak ‘distance’/‘laughed’
(6) aswil/xfats ‘sad’/‘rude’
(7) yëshaldëshe ‘deliverance’/‘grass’
(8) banim/kadar ‘boys’/‘balls’
(9) xore/forsef ‘winter’/‘burning’
(10) léxlibi ‘check’/‘crying’
(11) ikufala/txat ‘era’/‘envelope’
(12) gillmatxil ‘age’/‘starting’
(13) ashiri/uxda ‘rich (feminine)’/‘fact’
(14) daxxf/mauxa ‘urgent’/‘(they) protested’
(15) xaléxtot/léxet ‘fall’/‘walking (feminine)’

List 4
(1) harag/marak ‘killed’/‘soup’
(2) stimalyada ‘filling (noun)’/‘girl’
(3) rofelkafe ‘doctor’/‘coffee’
(4) mishkaaxyóm/xatul ‘glasses’/‘cat’
(5) shëleg/koshèlet ‘snow’/‘stumbling (feminine)’

(6) tapúax/sraux ‘apple’/‘wind’
(7) idolosod ‘I do’/‘secrets’
(8) kaxadaxa ‘like that’/‘cried’
(9) réaxmorôax ‘smell’/‘smears’
(10) hëlen/khexëlu ‘shock’/‘(they) started’
(11) pgish/tdrisha ‘meetings’/‘demands’
(12) karimizar ‘cold’/‘strange’
(13) rosethine ‘wants’/‘there’
(14) régalpëga ‘moment’/‘hindrance’
(15) shotkimboxim ‘silent (plural)’/‘crying (plural)’

Appendix 3: The rhyme pairs by categories
Set A—classical rhyme—ultimate stress
1.1 Precise “masculine” rhyme—open syllable: xatsa/parsta, bari/shikri, tkuf/atals; rofel/kafe.
1.2 Precise “masculine” rhyme—closed syllable: ishi/sheresht; menunam/ shamara, meaxaktxax; pgish/tdrisha.
1.3 Nonprecise “masculine” rhyme—closed syllable: shorlxamor; daxxf/ xatsa; gillmatxil; karimizar.

Set B—classical rhyme—penultimate stress
1.4 Precise “feminine” rhyme—closed syllable: xaxat/munaxat; liaxl/ malaxa; xaléxtot/léxet; réaxmorëax.
1.5 Nonprecise “feminine” rhyme—open syllable: këméndëni; gòvätlôov; léxlibëxi; régalpëga.
1.6 Nonprecise “feminine” rhyme—closed syllable: bëyitžäyt; dégel/ égel; motaxat/hoilaxat; tapúax/sraux.

Set C—grammatical rhyme
2.1 Feminine suffix—open syllable: lamdal/shamra; medinizha; ashtiral/uxda; stimalyald.
2.2 Masculine suffix—open syllable: konelyssax; meshane/meule; yifne/ rafe; rosethine.
2.3 Plural suffix—closed syllable: yeladimizin; shmumir/udax; banim/ kador; shotkim/boxim.

Set D—modernistic rhyme
3.1 Incomplete rhyme; voiced vs. voiceless coda: zarizmatriss; yaxadlxal/ muilaxat; aswil/xatsuf; haragmarak.
3.2 Incomplete “masculine” rhyme; open syllable vs. closed syllable: nashakashit, toremlmore, daxtasfimaxu, idolosdot.

3.3 Incomplete “feminine” rhyme; closed syllable: täyiltäyis, xöshexl nexasheit, raxasblfräxat, shëgelekosphëtë.

3.4 Incomplete “feminine” rhyme; closed vs. open syllable, non-identical vowel: la-lëxetlalëxa, sho-ëtettle-fëta, yëshaldëshe; hëlemlhexëlu.

Set D—non-rhyme

4.0 Contrasting stress: “feminine” vs. “masculine” rhyme: hiklikaiblitla; zëvellkovél; xërefisforef; kâxalbaxa.

5.0 Non-rhyme: no phonetic similarity between segments: me’llaron; axrayut/xultsa; këlevmistader; mishkafättimlkaatul.

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Abstract

In this article, I propose STRAIGHT as an image schema, discuss the evidence for this claim, and examine the relationship between some of the specific properties of this image schema in our experience and how they are extended into abstract domains. Relying on Johnson’s (1987) criteria for an image schema, I review research on the special role of straight lines in visual perception, and consider the relations between spatial and force-directive properties of straight bodily forms and movements, and of straight objects which we commonly encounter in our experience, particularly in industrialized societies.

An examination of metaphorical expressions in English and Russian shows that domains in these languages commonly characterized by STRAIGHTNESS—or its opposites—include time, events, discourse, thought, control, social norms, morality, truth, and law. The examples support findings from previous research that a duality commonly exists in systems of metaphors between OBJECT and LOCATION versions. Cultural models of the target domains are also discussed as a factor which motivates the metaphorical characterization of a domain as STRAIGHT or not, and whether that STRAIGHTNESS is evaluated as positive or negative.

Keywords: image schema; metaphor; morality; perception; straight.

1. Evidence for STRAIGHT as an image schema

Since Johnson (1987) presented his arguments for recognizing a number of image schemas as recurrent patterns, shapes, and/or regularities of our actions, perceptions, and conceptions, the bulk of the research ensuing from this study has focused on the metaphorical extension of image schemas to abstract domains. Though Johnson (1987: 106) notes that the list of image schemas he discusses is merely a selection of those he believes...