
THE SOUND-SYMBOLIC QUALITY OF WORD-INITIAL "GR-CLUSTER" IN MIDDLE ENGLISH ALLITERATIVE VERSE

Author(s): Piotr Sadowski

Source: *Neuphilologische Mitteilungen*, 2001, Vol. 102, No. 1 (2001), pp. 37-47

Published by: Modern Language Society

Stable URL: <https://www.jstor.org/stable/43346307>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



is collaborating with JSTOR to digitize, preserve and extend access to *Neuphilologische Mitteilungen*

JSTOR

THE SOUND-SYMBOLIC QUALITY OF WORD-INITIAL *GR*- CLUSTER IN MIDDLE ENGLISH ALLITERATIVE VERSE

1.0. Introduction: sound symbolism

Sound symbolism, or linguistic iconicity, is based on the assumption that language contains instances of a natural, imitative, non-arbitrary connection between the form of the linguistic sign and its meaning. At the same time the main thrust of modern, that is, post-Saussurean linguistics strongly supports the essentially arbitrary nature of the linguistic sign, a position that has acquired the status of a dogma among most linguists. But as early as 1922 Otto Jespersen seriously considered sound symbolism as a legitimate, if peripheral function of language (1922: 396–411), and after him Edward Sapir (1929: 225–239) and later Roman Jakobson (1987 [1979]: 182–196) were likewise drawn to the idea of a more natural reciprocity between sound and sense, especially in poetic language. In recent years the orthodox view of the nature of the linguistic sign has been more comprehensibly challenged in a cross-cultural and cross-linguistic collaborative study of sound symbolism edited by Leanne Hinton *et al.* (Hinton 1994), and most recently in Earl R. Anderson's *A Grammar of Iconism* (1998), where the author writes that while structuralists were right to insist that all linguistic signs are arbitrary, they were wrong to leap to the conclusion that no linguistic signs are non-arbitrary: iconic, or sound-symbolic signs, as partially resembling their referents, are composed of both arbitrary and non-arbitrary features (1998: 29).

As is now fully recognized (Hinton 1994:1–12), verbal iconicity extends far beyond the small class of onomatopoeic words, and constitutes a separate linguistic dimension referred to by Roger W. Wescott as “allolanguage” (1980: 19–36), denoting those aspects of language that are alienated from conventionally structured speech, so-called “microlanguage”. Allolanguage includes non-human communication systems, child language, interjections, language play and the like, characterised as expressive, affective, connotative – generally iconic. This is obviously not to say that all linguistic sounds carry natural signification, although a sizable category certainly does, even if particular sounds are symbolic only in some words and not in others.

The apparent contradiction in the genesis and communicative function of the arbitrary and iconic signs can be resolved, I think, within an evolutionary model of language as a system of communication used by humans in their interactions with the natural and socio-cultural environments. From a broad evolutionary perspective it is possible to talk about three main categories of linguistic signs: 1/ emotive, 2/ iconic, and 3/ arbitrary.

1.1. Emotive signs

Emotive signs belong to the most archaic, non-iconic and non-arbitrary system of auditory communication, expressing the emotional and physical states of the

speaker, and consisting of such vocalisations as interjections, grunts, moans, cries, whistles, clicks, coughing, hiccuping, expressive intonation and so on, also referred to by Leanne Hinton as “corporeal sound symbolism” (1994: 2). These vocal signs have arisen in the course of evolution as communicative responses to typical life situations such as survival, sexual behaviour, search for food, group integration and so on. The selective pressure must have favoured first of all various warning signals used in situations of crisis and urgency, as in group hunting or in times of danger from predators, elemental forces, or human foes. In such situations adaptive success clearly depended on the speed and accuracy of comprehension, which means that the sound-object connection must have been emotive and automatic, without the delaying mediacy of conscious deliberation. Emotive auditory signs are related to the deeply human (and probably mammalian) neurology and cognition, and as such are common to all humans, irrespective of culture or race. Emotive signs are non-iconic in the sense that their vocal shape bears no formal relation to the referent, as emotional states have no tangible “form”, and they are non-arbitrary in that the connection between the sound the corresponding emotional state is not learned but innate.

1.2. *Iconic signs*

Iconic, or sound-symbolic, signs are non-arbitrary and representational (referential) in the sense that the sound pattern bears a formal analogy to the physical properties of the denoted objects, states, and phenomena. The most obvious type of iconic sounds are onomatopoeic expressions, what Leanne Hinton calls “imitative sound symbolism” (1994: 3–4), often conventionalised into linguistic forms (e.g. *bang*, *cough*, *cuckoo*, *murmur* etc.) – a kind of primitive name for an object in the form of an imitation of the sound produced by it. Another type of verbal iconicity are synaesthetic signs, the result of an “acoustic symbolisation of non-acoustic phenomena” (Hinton 1994: 4; Anderson 1998: 191–218), the process whereby certain vowels, consonants and suprasegmentals are chosen to represent visual or tactile properties of objects, such as size, shape, brightness, softness, texture, temperature, movement, weight and so on. Synaesthetic iconicity represents a significant tendency in languages throughout the world: for example, in almost ninety per cent of the languages that have diminutive marking, the diminutive is symbolised by high front vowels (Hinton 1994: 4). Jespersen (1922: 400–401) and Jakobson (1987 [1979]: 188) also argued the existence of sound and colour patterns, whereby back vowels tend to denote dark colours (as in *gloom* or *glum*), and front vowels tend to be “bright” (*gleam*, *glitter*, *glimmer* etc.). Consonants too can relate to different physical properties referring to the relevant sensory experience, with plosives characterised as “hard” and sibilants as “soft”, or the liquid [r] described in sound-symbolic experiments as “rough”, “strong”, “heavy”, “bitter” etc, and [l] perceived as “tame”, “peaceful”, “smooth”, “light in weight”, “clear”, “weak” and so on (Jakobson 1987 [1979]: 187).

It could be argued that iconicity as an analogy between the speech pattern and the physical properties of the elements of environment was favoured by natural selection, as it allowed for quick identification of the relevant objects and for adequate adaptive reactions in relation to these objects. The benefits of spontaneous sound-symbolic communication have been demonstrated by experiments in which reaction-times of making correct judgements about the meanings of words were proven to be much shorter for sound-symbolic words than for arbitrary words (Hinton 1994: 11). In human and non-human world alike, speed and accuracy of communication are usually to the benefit of the speaker and hearer, and are greatly enhanced if the form of vocalisation is tied directly to meaning in a non-arbitrary way. In fact, as Leanne Hinton shrewdly observes (1994: 11), it is the evolutionary value of arbitrariness that must be explained.

1.3. Arbitrary signs

In the evolutionary perspective here adopted the much-celebrated arbitrariness of the linguistic sign must be related to the socio-cultural and historical factors, namely the gradual diversification of ethnic communities and the resulting independent linguistic developments. The diversification of lexicons and phonological systems of ethnic languages of the world must have been aided by, and in itself encouraged the gradual loss of linguistic iconicity in favour of arbitrariness, which has led in time to the situation, now evident, in which there may be practically as many different names for the same object as there are languages.

As a result of the evolution of the linguistic signs here hypothetically outlined, language must now present a three-tier structure as far as the relations between phonology and semantics are concerned: the bulk of speech sounds in any language consists of arbitrary signs, a smaller class of sounds can be described as iconic, and an even smaller class includes emotive signs. From a diachronic perspective, however, the proportions are reversed, in that language began as a system of emotive communication becoming gradually iconic and eventually arbitrary, as illustrated in a diagram below (fig. 1). It is unlikely, however, that emotive and iconic signs are ever to disappear completely from language; they are too much a part of human neurophysiology and innate cognitive apparatus.

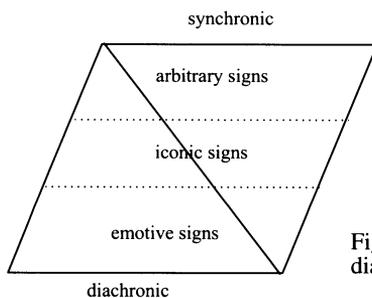
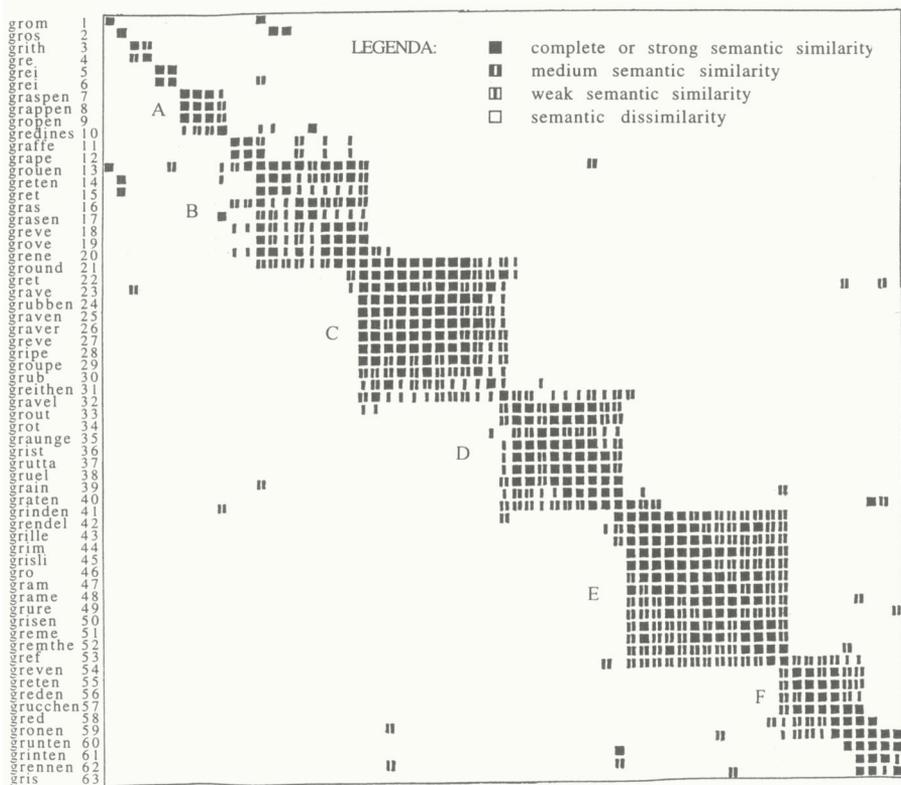


Figure 1. The emotive, iconic and arbitrary signs from a diachronic and synchronic perspective.

2.0. Middle English *gr-* words

Following the assumption about the possibility of a non-arbitrary link between the linguistic sign and its referent I want to investigate the sound-symbolic quality of ME *gr-* words, on their own and in the context of alliterative poetry. To identify the range of semantic field(s) denoted by ME *gr-* words I have examined the entire relevant lexicon as listed in the *Middle English Dictionary* (MED 1955). From every family of words I selected one item, usually a noun or a verb, less often an adjective, containing the main word-root. The complete list consists of 83 words of which 55 (66%) are of Old English provenance, 7 (8%) are of Norse origin, and 21 (25%) are French or Latin loan words. To offer a clearer visual picture of the semantic relationships between these words I have arranged them in the form of Czekanowski's symmetrical diagram of multi-variate distances (figure 2), which expresses graphically the degree of semantic difference between the *gr-* words. The difference has been computed according to the degree of overlap of classes of

Figure 2. Czekanowski's symmetrical diagram of semantic relationships between Middle English *gr-* words.



meaning as defined by *MED*, and the obtained numerical relationships have been converted in the chart into the corresponding graphic equivalents. The Appendix offers a brief description of how Czekanowski's symmetrical chart is achieved.

The analysis of semantic relationships based on the above procedure revealed first of all that of the initially selected 83 words nineteen (23 %) were found not to correlate significantly with any of the remaining words. These were accordingly excluded from the diagram. It is interesting to note, however, that seventy per cent of the rejected words (13 in total) are of non-English origin, that is, they are either Latin, French, or Norse borrowings. This shows that the *gr*- words that *do* correlate semantically in a significant way are mostly native Anglo-Saxon words, the fact that would suggest that the phono-semantic relations, at least in the examined example of *gr*- words, tend to be language-specific rather than universal in character. Accordingly, the 63 semantically related words constitute 77 per cent of the total lexicon of ME *gr*- words, a percentage high above what one would expect from a purely random, that is, arbitrary distribution of meaning among the phonetically related words.

A closer examination of the semantic relationships shown in the chart reveals the character and extent of meanings denoted by ME *gr*- words. The concentrations of black squares along the diagonal line correspond to the existing semantic fields, marked from A to F. The lexical and semantic content of these fields is the following:

A—This small and relatively isolated group is comprised of words such as *graspen*, *grappen*, *gropen*, and *gredines*, all meaning “to feel with the hands”, “to touch”, “to grope”, “to seize”. The word *gredines* provides here a remote link with *grasen* from group B, which describes the action of eating grass (grazing) by seizing and clutching it with the mouth;

B—A large group including the words *graffe*, *grape*, *grouen*, *greten*, *gret*, *gras*, *grasen*, *greve*, *grove*, *grene*, and *ground*. They all refer to fresh vegetation, plant life, and the act of growing; in a word, to the processes of natural life occurring above the ground;

C—An even larger group including the words *ground*, which provides a link with cluster B, *gret*, *grave*, *grubben*, *graven*, *greve*, *gripe*, *groupe*, *grub*, *greithen*, and *gravel*. All these words refer to holes, pits, graves, barrows, and the action of digging; in a word, to the inside of the earth and things underground, in contrast to the words from group B which describe the plant life above the ground;

D—A group including the words *gravel*, a border-word with group C, *grout*, *grot*, *grauge*, *grist*, *grutta*, *gruel*, *grain*, *graten*, and *grinden*. All these words refer to agriculture, in particular to the crushing and grinding of grain to obtain meal and flour;

E—A large group including the words *grendel*, *grille*, *grim*, *grisli*, *gro*, *gram*, *grame*, *grure*, *grisen*, *greme*, *gremthe*, *gref*, and *greven*. All these words describe the negative emotions of terror, fear, anger, fury, and hatred. The word *grinden* meaning

“to grind, crush, pierce, bite, chew, and eat” provides here a link with group D with its agricultural references;

F–A smaller group including the words *greven*, a border-word with cluster E, *greten*, *greden*, *gruccchen*, *gred*, *gronen*, and *grunten*. They all describe the emotions of sadness, grief, and pain manifested in mourning, weeping, and lamenting.

The ME *gr-* words thus group themselves into six clearly distinguished main clusters of meaning, but it is evident from a close analysis of the content of these clusters that they are all interrelated by means of polysemantic link words, and, moreover, when combined together they form a homogenous and logical semantic whole, especially on the figurative level of meaning, so important in poetry.

3.0. *Gr- words in alliterative poetry*

Sound-symbolic collocations are frequently used in poetry, especially in traditional metrical verse relying on such vocal devices as rhyme, reduplication of sounds or syllables, assonance, wordplay and alliteration – all ways of bringing together similar sounding words in a poetic line. Most typical for early English verse is alliteration (rhyme being a late medieval French borrowing), which is normally regarded as serving only a metrical and a semantic function: to hold a line of verse together as a kind of internal rhyme, and to group words carrying important meanings or themes (Borroff 1962: 28; Spearing 1970: 18–31; Turville-Petre 1977: 17; Boulton 1982: 67). But given the postulated iconicity of certain sounds it is possible to argue that the metrical and semantic functions are in poetry inseparably connected with the phonological one, in that certain meanings are attached to certain sounds and words in a predictable and non-accidental way. It would mean that in traditional alliterative poetry we are dealing with a two-way interdependency between sound and sense, whereby the need to group together thematically related words brings out a sequence of phonetically related words, and conversely, the choice of the alliterating sound provokes and predetermines specific meanings in a poetic line according to pre-existing sound-symbolic collocations.

The *gr-* words strung together in an alliterative line will predictably produce meanings relating to the semantic fields distinguished in figure 2, but it should be pointed out that technically speaking *gr-* words will also alliterate with other words beginning with [g], as alliteration concerns first of all the initial sounds in metrically prominent syllables. In this sense the *gr-* alliteration will be seen as a sub-category of the larger class of *g-* alliteration, which includes, among other possible combinations, an equally interesting case of sound-symbolic ME words beginning with *gl-*, such as *glas*, *glenten*, *glisnen*, *gliteren*, *gloren*, *glouen* and so on, which form interconnected semantic fields referring to light, brightness, seeing, and moving lightly, and which in many respects contrast and complement the darker and more negative meanings of *gr-* words, creating powerful poetic effects.

For example, cluster B with its explicit reference to vegetation and natural growth figuratively describes life processes in general, characterised by youth, freshness and newness, but also by inexperience and immaturity. These ambivalent meanings are especially borne out by the word *grene*, which denotes both the positive aspects of natural life and growth, and the negative connotations with pale, livid, and sickly colour of decay and putrefaction. In a word then, words from cluster B describe the natural cycle of life which proceeds from germination through growth to the inevitable decline, death, and decay.

This range of meanings is vividly illustrated by the poetic contexts of the words *grene* and its alliterative cognates, as found in the poems from MS. Cotton Nero A.x. (Cawley 1988). Thus in *Sir Gawain* the twig of holly held by the Green Knight is “grattest in grene when greuez ar bare” (l.206), in the springtime “Bothe groundez and the greuez grene ar her wedez” (l.508), and in the autumn leaves fall on the ground leaving the vegetation bare: “The leuez lancen fro the lynde and lyȝten on the grounde./And al grayes the gres that grene watz ere” (ll.526–27). In *Patience* Jonas is found looking at the lovely green leaves (“The gome glyght on the grene graciose leves”, l.453), and a similar poetic effect is produced in relation to the olive branch brought by the dove to Noah’s Ark in *Cleanness*: “Graciously umbegrouen al with grene leves” (l.488). In *Pearl* the idea of death and renewal of natural is conveyed through the image of the pearl sinking into the earth to be reborn, as in *John* 12:24–25: “For uch gresse mot grow of graynes dede” (l.31), and in *Cleanness* lack of green vegetation is the sign of the ultimate destruction of the fateful cities of Sodom and Gomorrah: “Schal never grene theron growe, gresse ne wod nawther” (l.1028). Finally, the real alliterative tour de force, combing the positive aspects of greenness with brightness and splendour of the Green Knight’s attire, is conveyed through “As growe grene as the gres and grener hit semed,/Then grene aumayl on golde glowande bryȝter” (ll.235–36).

After vegetation dies it naturally falls to the ground where it decomposes and blends with the earth, as in the above quoted line from *Pearl* (31). Accordingly, cluster C describes the interior of the earth as the realm where all life returns after death, and where it is “buried” in holes and pits, as in “Thurgh gresse to grounde hit [pearl] from me yot [went], (*Pearl*, l.10). Central to this group is the word *grave*, as a burial place dug in the earth, which complements the symbolic associations with death and decay implied by cluster B. The word *grub*, for instance, evokes sinister associations with worms gnawing at the decomposing flesh of buried corpses. By and large then, cluster C refers to the element of the earth, extended figuratively into the dark interior of the Underworld, the womb of the Mother Earth, and the grave as the ultimate end of life, as described in *Cleanness*: “Sodomas schal ful sodenly synk into grounde,/And the ground of Gomorrw gorde [plunge] into helle” (ll.910–11). Clusters B and C therefore complement each other by describing jointly the ambivalence of natural life and death.

Cluster D adds yet another dimension to the meanings contained in clusters B and C. Namely, it introduces an element of human intervention into the natural processes of life in the form of agriculture. Farming clearly has to do both with the earth and what grows on it, and is subject to the same seasonal cyclicality. The key words in this cluster are *grain* and *grinden*, describing the human action (in contrast to the processes of nature) of transforming the crop into edible flour. Figuratively, the agricultural aspect of words from cluster D imply man's mastery and control over nature, and its utilization for human benefit. In addition, the agricultural process of crushing and grinding of corn is analogized further with the natural processes occurring inside the earth where rocks, stones, and organic matter are broken up and crushed into smaller particles. The word *gravel*, for instance, refers to both kinds of processes, and consequently links the "agricultural" cluster D with the natural transformations inside the earth described by cluster C. These polyvalent symbolic associations are borne out by a line from *Pearl*: "The gravayl that on grounde con grynde/Wern precious perles of oryente" (80–82), which combines the action of grinding (death) with the element of the earth (grave), and the hope of renewal and salvation symbolized by the pearl.

Apart from the double meaning of grinding corn and crushing the stones the word *grinden* was also used to describe the chewing and mastication of food, as well as the cutting and piercing, as in a fight. On a figurative level these polyvalent meanings can be linked with the idea of violent death and dismemberment of the body in the jaws of a cruel chthonic monster such as Grendel. In the folklore of medieval England the imagery of grinding and dismembering the body features prominently in the tale of John Barleycorn, a popular personification of barley during seasonal country festivals, whose "passion" included the crushing and grinding of his body for the purpose of regeneration and renewal. In *Sir Gawain* the threatening noise coming from within the earth at the Green Chapel has a similar "grinding" quality: "Quat! hit clatered in the clyff, as hit cleve schulde,/As one vpon a gryndelston hade grounden a sythe" (ll.2201–2).

In this way words from cluster D are symbolically linked with cluster E and its sinister array of words expressing cruelty, anger, and terror. In keeping with the other word-groups linked to the theme of death, cluster E describes the highly negative emotions of fear and aggression accompanying sudden and violent death. Only implied in cluster B in the cyclicality of natural life, the theme of death enters with the gruesome imagery of life decomposing in the earth in cluster C, to be reinforced with the images of grinding and morcelling of the body in cluster D. The words from cluster E in turn develop the theme further by adding an emotional dimension in its description of the horror and cruelty of death itself, as illustrated by God's wrath described in *Cleanness*: "And gremed therwith the grete lorde, and greve [punish] hym he thought" (l. 138), and "The grete God in his greme bygynnes on lofte/To wakan wederes so wylde" (ll.947–48). God's righteous anger is here also contrasted with the fury of proud Belshazzar during his feast: "And if thay

gruchen him his grace, to gremen his hert./He cleches to a gret klubbe and knokkes hem to peces” (ll.1347–48).

The effects of terror evoked by *gr*- words are not lacking in *Sir Gawain*, as in the description of the ferocious boar hunted in the woods: “For he watz breme, bor alther-grattest,/Ful grymme quen he groyned; thenne greued mony” (ll.1441–42), or of the taunts and threats of the Green Knight at Arthur’s court: “Where is now your sourquydrye and your conquestes,/Your gryndellayk and your greme, and your grete wordes?” (ll.311–12). In the final showdown at the Green Chapel Gawain’s horror at his near death is fittingly conveyed in the grimly-sounding alliterative sequence: “Thenne the gome in the grene graythed hym swythe,/Gederez vp hys grymme tole Gawayn to smyte” (ll.2259–60), with the rest of the scene containing such evocative lines as “Gawayn ful gryndelly with greme thenne sayde” (l.2299); “That other stif mon in study stod a gret whyle,/So agreued for greme he gryed [shuddered] withinne” (ll.2369–70); and the curt “He groned for gref and grame” (l.2502).

Finally, group F completes the theme with a description of emotions of those who survive the dead only to mourn and lament them. While the emotions described in cluster E concern either those who deal a violent death or die as a result of it, cluster F highlights the feelings of sadness of those who stay alive to weep and grieve the loss of their dear ones. The theme of death, both in its relation to nature and to human life, thus makes a full circle, as the return to the plant life from cluster B reinforces the eternal cyclicity of life, death, and renewal. The lamenting, woeful tone of this word-group is illustrated by *Patience* (l.53): “What graythed me the grychchyng bot grame more seche?” (What would grumbling do for me except to invite more trouble?), or by *Cleanness* (ll.159–60): “Greving and gretyng and grysping harde/Of tethe tenfully togeder” (Wailing and weeping and bitter gnashing of teeth in anguish).

The presented analysis of the semantic content of ME *gr*- words has clearly revealed that words selected according to a phonetic criterion can form a semantically identifiable and homogenous whole. More precisely, a set of phonetically-linked words, as in traditional alliterative poetry, can refer to a small number of interrelated semantic fields of considerable internal logic and consistency. This seems to show that rather than talking of alliteration merely as an element of prosody, we should consider it as being inseparable from the semantic content and the poetic process in which specific meanings call for specific sounds and vice versa.

The fact that the *gr*- words consistently refer to natural life, death, fear, anger, grief and sadness, that is, to the negative aspects of existence, should probably be linked with the onomatopaeic quality of the sounds involved. Marjorie Boulton (1982: 63–64) argues that stops and affricates such as [g], [k], [ts], and [tʃ] suggest harshness, violence, cruelty, movement, discomfort, noise, and conflict, as does the rolled [r] sound. Similarly, Jakobson (1987: 191) quotes sound-symbolic

experiments in which the sound [r] was described as “wild”, “pugnacious”, “manly”, “rolling”, and “hard,” an argument suggesting a more universal character of at least some symbolic sounds. A cross-linguistic analysis of selected sounds, such as the *gr-* words discussed in this paper, should throw more light on the problem of universality versus language specificity of sound symbolism. The following jesting lines from Goethe’s *Faust* (1959: ll.7093–7098) can offer some suggestion in this direction:

Nicht Greisen! Greifen! – Niemand hört es gern,
 Daß man ihn Greis nennt. Jedem Worte klingt
 Der Ursprung nach, wo es sich her bedingt:
 Grau, grämlich, griesgram, greulich, Gräber, grimmig,
 Etymologisch gleicherweise stimmig,
 Verstimmen uns.

American College Dublin

PIOTR SADOWSKI

REFERENCES

- Anderson, Earl R., 1998. *A Grammar of Iconism*. Fairleigh Dickinson University Press/London: Associated University Presses.
- Borroff, Marie, 1962. *Sir Gawain and the Green Knight: A Stylistic and Metrical Study*. New Haven: Yale University Press.
- Boulton, Marjorie, 1982. *The Anatomy of Poetry*. London: Routledge & Kegan Paul.
- Cawley, A. C., and J. J. Anderson (eds.), 1988. *Pearl, Cleanness, Patience, Sir Gawain and the Green Knight*. London-Melbourne: J. M. Dent.
- Goethe, Johann Wolfgang von, 1959. *Faust, 2nd Part*, in: *Goethes Poetische Werke*. Vol. 5: 7093–7098. Stuttgart: J. G. Cotta’sche Buchhandlung Nachfolger.
- Hinton, Leanne (ed.), 1994. *Sound Symbolism*. Cambridge: Cambridge University Press.
- Jakobson, Roman, and Linda R. Waugh, 1987. *The Sound Shape of Language*. 1979. Berlin-New York-Amsterdam: Mouton de Gruyter.
- Jespersen, Otto, 1922. *Language: Its Nature, Development and Origin*. London: Allen & Unwin.
- Middle English Dictionary, 1955. eds. Sherman M. Kuhn and Hans Kurath. Ann Arbor: University of Michigan Press.
- Sadowski, Piotr, 1991. “The Greenness of the Green Knight: A Study in Medieval Colour Symbolism”, *Ethnologia Polona* 15/16: 61–80.
- Sapir, Edward, 1929. “A Study in Phonetic Symbolism”, *Journal of Experimental Psychology* 12: 225–239.
- Spearing, Anthony C., 1970. *The Gawain-Poet: A Critical Study*. Cambridge: Cambridge University Press.
- Turville-Petre, Thorlac, 1977. *The Alliterative Revival*. Cambridge: D. S. Brewer.
- Wescott, Roger Williams, 1980. *Sound and Sense: Linguistic Essays on Phonosemic Subjects*. Lake Bluff, Ill.: Jupiter Press.

Appendix

JAN CZEKANOWSKI'S SYMMETRICAL DIAGRAM OF MULTI-VARIATE DISTANCES

Czekanowski's diagram is a useful statistical method for representing graphically the degrees of similarity between a large number of objects (here: words) compared on the basis of many variables or features (here: classes of meaning). The method was first used in anthropology for statistical analyses of the craniometric features of human skulls.

The stages in the preparation of Czekanowski's diagram are the following:

1/ Preparation of a multi-variate matrix of objects and their attributes (e.g. skulls and their craniometric features; words and their meanings; literary characters and their traits *etc.*). The objects have to satisfy the basis criterion of selection, that is, they have to belong to the same class (here: ME words beginning with *gr*-);

2/ Preparations of a symmetrical matrix of multi-variate distances (*d*) expressing numerically the degree of difference between the objects, treated here as sets of features (attributes). The distances are computed according to the formula:

$d(A, B) = A \Delta B / A \cup B$, in which A and B are the objects, Δ is the difference between these objects, and \cup is the sum of these objects.

The result is contained between 0 (no difference, i.e., identity) and 1 (complete difference, i.e., no elements in common). For example:

A	B		A	B	
x	x		x	x	
x	x	$d=1/4=0.25$	x		$d=3/4=0.75$
x	x		x		
x			x		

3/ Once the multi-variate distances are computed for all objects (each with all the rest), the objects are then rearranged according to the degree of difference, so that the most similar objects are put together. (The numerical matrix is only an intermediary step, and it has not been included in the paper);

4/ The rearranged numerical matrix is converted into a graphic chart, in which the consecutive classes of distances from 0 to 1 are expressed graphically, for example:

■	0–0.25	identity or very close similarity
▒	0.26–0.50	medium similarity
░	0.51–0.75	weak similarity
□	0.76–1	complete difference

In this way the concentrations of black squares along the diagonal of the symmetrical matrix group together identical and most similar objects.