From *slifor* to *Slytherin*: The relationship between word form and meaning

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Summary

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This study examines whether English consonant clusters carry intrinsic meaning in submorphemic units known as *phonesthemes* – defined by the Oxford English Dictionary as 'a phoneme or group of phonemes having recognisable semantic associations, as a result of appearing in a number of words of similar meaning'[1]. Firstly, a corpus analysis of the British National Corpus (BNC) was undertaken to establish the frequency with which particular *onset clusters* – groups of two or more consonant sounds which precede a vowel at the start of a word, e.g. **str-** in *strike*, *stretch* and *string* – can be mapped to words from the same semantic field in Present Day English (PDE). This revealed a high level of sound-meaning correspondences across the vast majority of English onset clusters. Secondly, L1 speakers were asked to identify the meanings of obsolete Old English (OE) and Middle English (ME) words containing the most coherent of these onsets in a free association task and a multiple-choice task. Results show a high incidence of phonesthemic matches in the former and a statistically significant number of such matches in the latter.

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1 www.oed.com/view/Entry/142612?redirectedFrom=phonestheme#eid

These findings suggest that English phonesthemes carry intrinsic meaning as psychologically real units of language and that the concepts embodied within them can be recognised by native speakers.

Introduction

This study addresses two basic questions: is there a preponderance of words with the same onset cluster which relate to the same concept in PDE? And can native speakers identify phonesthemes in obsolete OE and ME words to deduce meaning? If phonesthemic onset clusters are intrinsically meaningful units of language, then it is highly likely that they are also present in older forms of English and that their semantic features are recognisable to native English speakers today. Evidence of collective associative traits with regard to particular phonesthemes should also indicate whether some phonesthemes are stronger than others.

While the quality of vowel sounds has changed dramatically as English has evolved, most PDE consonants have similar phonetic values to those of OE and ME. There is also a general recognition that sound symbolic forms are less susceptible to phonological change, because recurrent sound-meaning associations lengthen their survival and lead to the assimilation of new phonesthemic member words to their number (Waugh 1979:207). This means that if research participants associate obsolete words e.g. OE *gled* ('a burning coal') with the proposed phonestheme intrinsic to the onset **gl-** ('relating to light and vision'), the mapping of phonological form to meaning is consistent with the OE pronunciation of the cluster.

The notion that phonesthemes exist is in itself controversial. For instance, the seminal maxim of Ferdinand de Saussure states that the relationship between the signifier – the sound pattern produced in articulation of the word – and the signified – the concept which this sound pattern denotes – is arbitrary (Saussure 1916/1971:100–101). The existence of the phonestheme also contradicts the orthodox position expounded by Nida (1949) and Hockett and Hockett (1960:90) that the morpheme is the smallest meaningful unit of language. However, proponents of *phonosemantics*, such as Wallis (1653), Sapir (1929), Bloch (1947), Bolinger (1950, 1965), M W Bloomfield (1953), Marchand (1959), and Rhodes and Lawler (1981) contend that the sound pattern of the signifier carries inherent content and encapsulates the essence of the signified concept, and that the phonestheme is a meaning-carrying unit intermediate on a hierarchical scale between the phoneme and the morpheme (Abelin 1999:6). Bolinger (1950:119–120) and Rhodes and Lawler (1981:339–340) also found that the critical factors in cementing sound-meaning mappings are the convergence of word semantics based on analogy and their emerging use, rather than word etymology. One example of this is the evolution of the ME verb *fnesen* ('sneeze'), via *neeze* to *sneeze* in the 15th century. It is likely that the phonetic appropriateness of the **sn-** cluster and its associations with the nose led to *sneeze* being widely adopted and superseding the older forms.

Bolinger (1950) divides monosyllabic words into *assonances* – initial consonants and consonant clusters, and *rimes* – the vowel nucleus and final consonant(s). Many rimes carry little meaning when separated from their onsets – removing the **gl-** onset

from *glint* and *glitter* leaves *-int* and *-itter*, which are not meaningful in themselves (Bergen 2004:293) – but some rimes evoke consistent associations and can reinforce phonesthemic input attached to an onset cluster (Wescott 1987:68). While this study focuses on phonesthemic onset clusters, the influence of certain rimes in sound-meaning associations is considered in light of the research results.

Previous attempts to identify phonesthemes have focused on: a) quantifying how often sound-meaning associations occurred when words with the same onset cluster and similar meanings were grouped (Firth 1930, 1935, Householder 1946, Lawler 1990, Rhodes and Lawler 1981); b) targeting unconscious language processing through *priming studies*[2] to support the view that phonesthemes are psychologically real (Abelin 2012, Bergen 2004); c) examining whether research participants can associate neologisms with semantic domains identified with phonesthemes and use these forms productively (Abelin 1999, Hutchins 1998, Kwon 2016, Magnus 2000); and d) comparing sound symbolic and non-sound symbolic archaic words to ascertain the usefulness of sound symbolism for vocabulary acquisition (Parault 2006). This research combines corpus evidence of the relative phonesthemic coherence of PDE consonant clusters with a questionnaire using uncontextualised stimulus words long obsolete in PDE. It is argued that using phonesthemes from obsolete words with attested histories and meanings is a more reliable measure of sound symbolism than using nonce words[3] which have never, as far as we know, existed.

Methodology – corpus study

Word selection

The British National Corpus (BNC) was selected for the corpus study as a well-rounded, easy-to-use and comprehensive corpus. Proper nouns, nonsense words and lemmas[4] appearing fewer than five times in the corpus were not included in the dataset. Polysyllabic words and words from the same word family[5] were then removed, leaving a total of 1,639 words. Limiting the corpus study to monosyllables and extended monosyllables (i.e. monosyllables with a suffix – see Table 1) results in a more user-friendly and more accurate dataset, because additional morphemes which could obscure the essential semantic features of a given monosyllabic root word are excluded. Once the data had been processed, the number of words which corresponded to the phonestheme(s) identified with each of the 32 clusters was

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2 These studies exposed research participants to stimulus words (primes) and measured whether reaction times for speed of word recognition were increased when stimulus words contained target phonesthemes.

3 Words coined for use 'on one specific occasion or in one specific text or writer's works' (OED, *nonce-word*). In these studies, words were invented to test whether research participants could identify word meaning from words featuring the target phonesthemes.

4 Words or phrases in the form that they would appear in a dictionary or word list.

5 Groups of words with a common root. In testing for phonesthemic coherence only one word per family was included, so *blood* was counted but not *bloody*, *bleed* or *bleeding* or compounds like *bloodbath*, *bloodsucker* etc.

analysed, and a phonesthemic coherence level (proportion of phonesthemic words per onset cluster) calculated.

Table I: List of suffixes used in the corpus analysis

Suffix	Examples
-a	plaza, stoma, trauma
-al	plural, scandal, spiral, special
-ant	blatant
-ar	grammar
-ard	blizzard
-as	fracas
-ate	frigate, private
-ee	squeegee
-el	brothel, drivel, grovel, shrivel, squirrel, travel
-en	bracken, craven, swidden
-ent	strident
-er	bladder, clever, flower, glister, grocer, proper, slaughter, spider
-ern	slattern
-ess	prowess
-et	blanket, bracket, closet, plummet, skillet, snippet, trumpet
-ey	blimey, spinney, storey, trolley
-ic	clinic, drastic, plastic, sceptic, traffic, tragic
-ice	crevice, practice
-id	frigid, splendid, stupid, stolid
-ie	floozie, prairie, stymie
-ile	fragile
-in	cretin
-ion	fraction, friction
-is	crisis, praxis, stasis
-ish	blemish, brandish, brackish, skittish, squeamish
-it	plaudit, spirit
-le	bristle, crackle, drizzle, frazzle, scramble, smuggle, struggle
-ly	grizzly, sprightly
-o	blotto, bronco, fresco, stucco, trio
-om	blossom, slalom
-on	bludgeon, flagon, klaxon, prison
-or	sponsor
-ot	spigot
-our	flavour, glamour
-ous	precious, scrumptious, specious
-ow	sparrow, swallow
-re	spectre
-some	gruesome
-ty	frowsty

-ue	statue
-ure	brochure
-us	crocus
-y	brandy, clumsy, clergy, plenty, proxy, study

Total number of monosyllables + suffix in the corpus analysis = 364
Total number of monosyllables in the corpus analysis = 1,275
Total number of lemmas in the corpus analysis = 1,639

While several of these suffixes may be the same phonetically, e.g. -al, -el, -le = /əl/; -a, -ar, -er, -or, -re = /ə(r)/, they have been listed separately to illustrate the choices made in selecting words with these suffixes for corpus analysis.

Phonestheme selection

In a comprehensive study, Hutchins (1998) compiled a list of phonesthemes taken from 15 sources in the academic literature from 1922 (Jespersen) to 1981 (Bolinger and Sears) and formulated composite glosses to summarise the phonesthemes identified. These glosses were used as the basis for the phonesthemes listed for each onset cluster in the present corpus research, supplemented by phonesthemes identified by Rhodes and Lawler (1981) and Lawler (1990), although occasionally a reworded gloss was deemed more suitable. Each onset had one to four proposed phonesthemes into which words from the corpus dataset were categorised (see Table 2). For the few onsets without proposed phonesthemes, the most consistent sound-meaning mappings were noted to see if any significant patterns could be detected.

Table 2: Phonesthemes used in the corpus analysis and their sources

Cluster	**Proposed phonestheme**	**Source**
bl-	excess (too much)	Lawler (1990)
	colour (optical properties)	Rhodes and Lawler (1981)
	compressed fluid	Lawler (1990)
	swollen, inflated, round	Hutchins (1998)
br-	gender roles (male)	Lawler (1990)
	bristly things – one-dimensional connected	Lawler (1990)
	gender roles (female)	Lawler (1990)
	unpleasant noise	Marchand (1959)
cl-	adherence, connection	Lawler (1990), Hutchins (1998)
	impact of coming together	Lawler (1990), Hutchins (1998)
cr-	bent, crooked	Rhodes and Lawler (1981)
	harsh, grating or unpleasant noise	Hutchins (1998)
dr-	liquids	Rhodes and Lawler (1981)
	pulling along or down	Hutchins (1998)
	having a languid, listless quality	Hutchins (1998)

fl-	inconstancy, insubstantial nature*	My definition
	two-dimensional	Rhodes and Lawler (1981)
	extended, repeated, rhythmic motion	Hutchins (1998)
	lateral movement*	My definition
fr-	friction, fraying, wispy, insubstantial*	My definition
gl-	light and vision	Hutchins (1998)
	smoothness*	My definition
gn-	nibbling, biting*	My definition
gr-	negative emotion or complaint	Hutchins (1998)
	deep-toned, threatening noises	Hutchins (1998)
	growth*	My definition
	holding on tightly	Hutchins (1998)
kn-	three-dimensional convex	Rhodes and Lawler (1981)
	pinching and squeezing*	My definition
pl-	two-dimensional thick	Rhodes and Lawler (1981)
pr-	human social roles and behaviour	Lawler (1990)
	one-dimensional extended	Lawler (1990)
qu-	shake, tremble, wobble	Marchand (1960)
sc-/sk-	two-dimensional extended	Rhodes and Lawler (1981)
	superficial movement, surfaces, edges or thinness	Hutchins (1998)
scr-	scrapped and scrunched; fragments of the whole*	My definition
	extended 2D space + lateral or scrambled movement*	My definition
	unpleasant sounds, irregular movement	Hutchins (1998)
	two-dimensional extended + one-dimensional motion	Lawler (1990)
shr-	shrinking*	My definition
	shrieking*	My definition
sl-	pejorative: lazy, slovenly, careless	Hutchins (1998)
	downward movement, direction or position	Crystal (1995)
	liquid/solid interface	Lawler (1990)
sm-	press close, choke*	Hutchins (1998)
	belittling, insulting, pejorative*	My definition
sn-	nose breathing, snobbishness, inquisitiveness	Hutchins (1998)
	unpleasant	Crystal (1995)
	three-dimensional convex w/ concave (nose)	Lawler (1990)
	three-dimensional convex w/ concave (fingers)	Lawler (1990)
sp-	bring to a point; send out or extend from a point	Hutchins (1998)
	rush of liquid*	My definition
	cylinder	Rhodes and Lawler (1981)
spl-	one-dimensional to two-dimensional	Lawler (1990)
	to diverge or spread out from a point	Hutchins (1998)
spr-	extrusion (plant)	Lawler (1990)
	to radiate out from a point or to be elongated	Hutchins (1998)
squ-	compression or constriction	Rhodes and Lawler (1981)
	discordant noise*	My definition

st-	something firm, upright, regular or powerful	Hutchins (1998)
	one-dimensional rigid	Rhodes and Lawler (1981)
str-	use of muscles or forceful action in a line; something linear	Hutchins (1998)
	long, thin, stretched out	Firth (1935)
	one-dimensional non-rigid	Rhodes and Lawler (1981)
sw-	smooth, wide-reaching movement	Crystal (1995)
	rotary motion, curved path	Rhodes and Lawler (1981)
	oscillate, undulate, move rhythmically to and fro	Hutchins (1998)
	swagger*	My definition
thr-	constricted path	Rhodes and Lawler (1981)
	intense pain or emotion*	My definition
tr-	travel	Lawler (1990)
	a path, walk in a line	Hutchins (1998)
	locomote by foot; step forcibly	Hutchins (1998)
tw-	to turn, distort, entangle, or oscillate; or the result of this	Hutchins (1998)
	small sounds or small, chiefly twisting movements	Marchand (1960)
	twisting, spinning, pulling, plucking*	My definition
wh-	noises of air or breath or forcible movement	Marchand (1960)
	rapid movement of air or water*	My definition
wr-	twist, distort	Marchand (1960)
	irregular motion; or to twist, turn, or coil	Hutchins (1998)

* Phonesthemes proposed by rewording or synthesising Hutchins's (1998) composite glosses and through analysis of the BNC data.

Results – corpus study

After the monosyllables and extended monosyllables (hereafter collectively referred to as *monomorphemes* for convenience) for an onset had been collated, each word was analysed to determine whether at least one of its meanings corresponded to the semantic domain of one or more of the proposed phonesthemes. If so, this word was judged to add to the phonesthemic coherence of the cluster. For words which did not seem to correspond to any phonestheme, the OED was consulted to ensure that all possible definitions for polysemous words had been considered. Results of the coherence analysis for each onset cluster are detailed in Appendix 1.
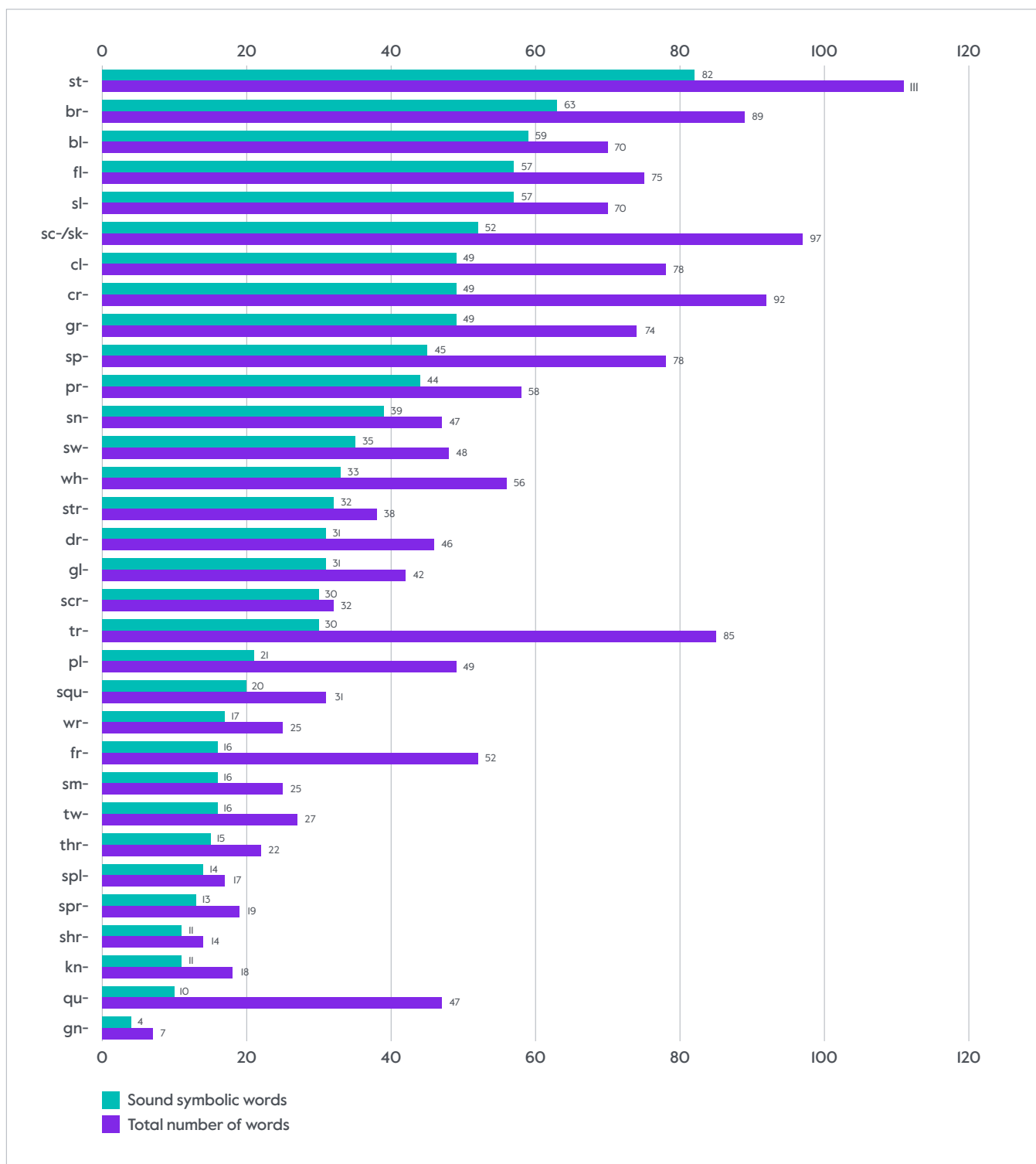
Figure 1: Sound symbolic monomorphemes and total number of monomorphemes per cluster

The total number of monomorphemes and sound symbolic monomorphemes per cluster is recorded in Figure 1. 1,051 of 1,639 monomorphemes fit into the phonesthemic categories associated with the onset clusters in the corpus study (64.12%). Although the most lexically frequent **st-** onset also has the highest number of sound symbolic monomorphemes, correlation analysis established that there is no statistically significant relationship between lexical frequency and the strength

of the sound-meaning association. The **bl-**, **fl-** and **sl-** onsets also contain a high number of monomorphemes and a high number of sound symbolic monomorphemes, but other lexically frequent clusters, such as **tr-** and **fr-**, have a relatively low number of sound symbolic words. In fact, many low-frequency clusters have a high proportion of monomorphemes with sound symbolic content – **spr-**, **spl-**, **shr-** and **thr-** all have phonesthemic coherence levels of 68% or more. The proportion of sound symbolic monomorphemes/total number of monomorphemes per onset cluster is outlined in Figure 2.
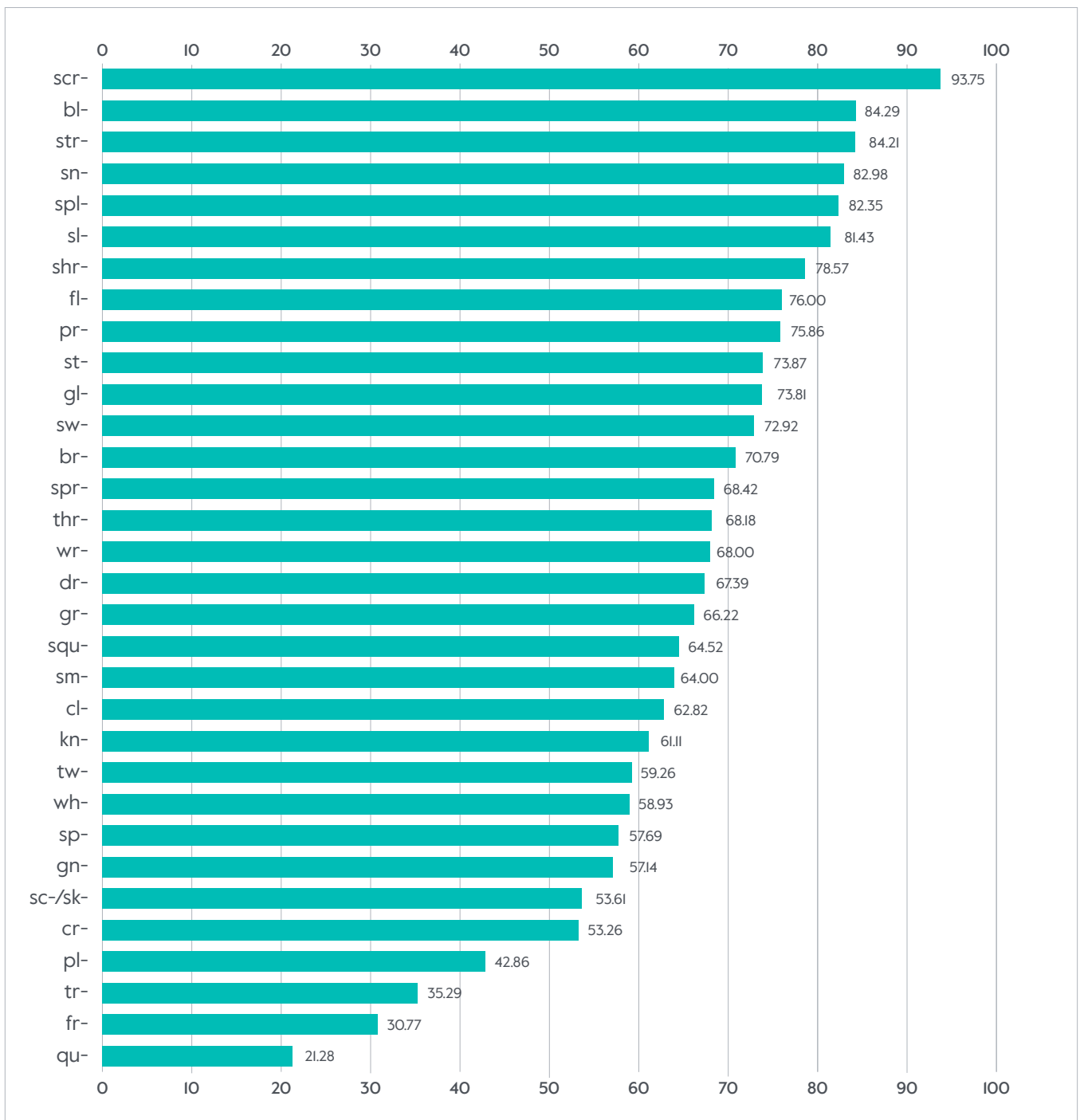

Figure 2: Level of phonesthemic coherence in monomorphemes per onset cluster (%)

While the phonesthemic coherence figure gives a broad picture of the sound symbolic properties of each cluster, it does not capture how frequently monomorphemes fall into the different semantic domains associated with each phonestheme. This information is summarised in Appendix 1. The complexity of the phonosemantics uncovered through the corpus analysis is illustrated in Table 3. Semantic glosses summarise the phonesthemes associated with each cluster, with key words given as example monomorphemes for these phonesthemes.

Table 3: Onset clusters and their phonesthemes with semantic glosses and key words

Onset cluster	Coherence level (%)	Semantic gloss	Key words
scr-	93.75	lateral, often irregular surface movement; unpleasant sounds; balled-up objects or torn fragments	scramble, screech, scrap
bl-	84.29	colour; or swollen, inflated or relating to excess	blood, bloat, blush
str-	84.21	use of muscles or forceful action in a line; something linear with breadth	stretch, strain, strap
sn-	82.98	to do with the nose or breathing; unpleasantness, arrogance; three-dimensional convex w/ concave (fingers)	sniff, snort, snap
spl-	82.35	to diverge or spread out from a point	split, splay, splash
sl-	81.43	downward movement, direction or position; pejorative: lazy, slovenly, careless; liquid/solid interface	slope, slump, slime
shr-	78.57	contract, get smaller; or high-pitched noise	shrink, shrivel, shriek
fl-	76.00	two-dimensional lateral orientation; extended, rhythmic often lateral movement; or inconstant, insubstantial in nature	flow, float, flag
pr-	75.86	relating to established human social roles, manners and behaviour; or long, narrow objects that stick out	proper, prim, prick
st-	73.87	something firm and upright; or fixed, regular or powerful	stand, stone, stake
gl-	73.81	relating to light or vision; smoothness	glow, glance, glide
sw-	72.92	smooth, wide-reaching movement, rocking motion to and fro; or pompous, ostentatious movements or behaviour	swing, sway, swagger
br-	70.79	bristly objects; stereotypically male or female gender roles	bristle, brute, breed
spr-	68.42	radiating outward from a point, extrusion	spray, sprout, spread
thr-	68.18	a constricted path; or intense, oppressive pain or emotion	through, throat, throb
wr-	68.00	twisting, turning, distorting	wrap, wrinkle, wrench
dr-	67.39	relating to liquids; pulling along or down, or having a languid, listless quality	drink, drag, droop
gr-	66.22	negative emotion or complaint; deep-toned, threatening noises; growth; holding on tightly	groan, grumble, grind, grip
squ-	64.52	compression, constriction; or discordant noise	squash, squeeze, squeal
sm-	64.00	press close, choke, sully; or belittling, superior, condescending	smear, smother, smug
cl-	62.82	adherence, connection; or the impact of coming together	cling, clamp, clash
kn-	61.11	round bumps or protrusions; or pinching and squeezing	knob, knot, knead
tw-	59.26	small sounds or small, chiefly turning and pulling movements	tweak, twist, twitch
wh-	58.93	noises of air, breath or water or forcible movement	whirl, whisper, wheeze
sp-	57.69	send out or extend from a point; bring to a point; gush out	spike, spurt, spit
gn-	57.14	nibbling, biting	gnaw, gnash, gnarled

sc-/sk-	53.61	superficial movement, often across a surface; relating to edges or thinness	skim, scan, skin
cr-	53.26	bent, misshapen; or harsh, jarring or unpleasant noise	crook, crouch, creak
pl-	42.86	flat, thick or layered two-dimensional objects	plate, plank, plaster
tr-	35.29	purposeful movement from A to B; a path, walking in a line; stepping forcefully	trail, track, tread
fr-	30.77	relating to wearing away, and wispy insubstantial objects	fray, frazzle, froth
qu-	21.28	shake, tremble, wobble	quake, quiver, queasy

The corpus study found that words can often be mapped to multiple phonesthemes associated with a particular onset. For example, *slip* matches all three of the **sl-** phonesthemes: 'liquid/solid interface', 'pejorative: lazy, slovenly, careless' and 'downward movement, direction or position'. Phonesthemes associated with a particular cluster are themselves intertwined, allied to the core semantic feature through metaphorical extension: **sn-** relates to the nose and breathing but also to sneering and snootiness, and **sw-** relates to swinging movement but also the swagger of ostentation. This type of linking through metaphor echoes Lakoff and Johnson's (1980:6) notion of how the human conceptual system is structured.

Methodology – questionnaire

Conceptual framework

The tasks in the questionnaire are essentially word association tasks, with participants asked to respond to obsolete stimulus words containing the onset phonesthemes. The questionnaire is divided into two parts: a free association task, and a multiple-choice task in which participants were asked to match the cue word to one of 11 semantic glosses. The two tasks were designed to reveal whether a free, more instinctive association with the cue word gives a greater 'strike rate' than the conscious linking of phonological and orthographical form with meaning. Response behaviour was then analysed to see whether associations were based on phonesthemes or could be attributed to some other factor.

Onset cluster selection

The following criteria were considered when determining which onset clusters to use in the second part of the study:

- phonetic values – clusters where pronunciation has changed since the OE period have been omitted

- phonesthemic coherence – onsets below a 60% phonesthemic coherence threshold were not considered

- onsets with overlapping phonesthemes – where the sound symbolism of different clusters overlapped, the most phonesthemically coherent clusters were retained

- number of documented obsolete words – at least eight documented examples of obsolete words per cluster were required for the questionnaire

- accessibility of glosses – the categorisation of a small number of phonesthemes according to athematic metaphor[6] (Rhodes and Lawler 1981) was felt to be too abstract or vague for research participants, so these clusters were omitted

- independence of glosses – following a pilot study, the reference to 'smoothness' was removed from the **gl-** gloss, as this overlapped with a principal feature of the **sw-** onset.

This left 11 onset clusters for the second phase of the research: **bl-**, **cl-**, **fl-**, **gl-**, **scr-**, **sl-**, **sn-**, **spr-**, **st-**, **sw-** and **thr-** (see Table 4).

Table 4: Revised semantic glosses used in Part 2 of the questionnaire

Onset cluster	Semantic gloss
sn-	a) to do with the nose or breathing; arrogance, contempt
gl-	b) relating to light or vision
bl-	c) colour; or inflated, puffy; or relating to excess
spr-	d) radiating outward from a point, extrusion
sl-	e) downward movement or position; liquid/solid interface; or pejorative
thr-	f) a constricted path; or intense pain or emotion
fl-	g) two-dimensional orientation or lateral movement; inconstant, insubstantial
st-	h) something firm and upright; or fixed, regular or powerful
scr-	i) irregular surface movement; unpleasant sounds; stunted growth
cl-	j) adherence, connection; or the impact of collision
sw-	k) smooth, wide-reaching movement, rocking motion; or ostentation

Words which contained the target onsets were avoided in the final composite glosses, and every effort was made to make the glosses independent of each other, notwithstanding the fact that certain phonesthemes have features in common.

Word selection

The obsolete words used in the study were taken from *Bosworth Toller's Anglo-Saxon Dictionary*[7], the *Middle English Dictionary*[8], and the *Oxford English Dictionary*[9]. Old English <þ> and <ð> were transliterated to <th>. Words with recognisable PDE descendants were excluded from consideration. Eight words were chosen per onset cluster (see Appendix 2) to cover the different phonesthemes corresponding to each onset, and to expose research participants to a wide range of words. The cue words were divided into four sets of 22 (I to IV), and participants were given a different set of cue words for each task in the questionnaire. Four separate questionnaires were created so each cue word could be tested in both tasks (see Appendix 3).

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6 Rhodes and Lawler (1981) posit that there is a classifier system whereby the set of relationships between assonance and rime indicate factors such as shape, dimensionality, physical state, shape of paths, types of motion etc.

7 boswothtoller.com

8 quod.lib.umich.edu/m/middle-english-dictionary/dictionary

9 www.oed.com

Tasks and procedure

Research participants were shown the relevant part of the questionnaire and cue words were read out to provide an aural as well as a visual stimulus. In the Part 1 task, participants were encouraged to give reasons why they connected the cue words with particular concepts, giving a qualitative aspect to this task. In the Part 2 task, participants matched cue words to the semantic glosses identified with the phonestheme(s) proposed for each onset cluster. 96 L1 English university graduates took part in this study; 48 females, 47 males and one participant who identifies as non-binary, with ages ranging from 25 to 78. None of the participants had studied OE or ME previously.

Results – Questionnaire

Part 1 results

Responses were grouped as 'hits' or 'misses', depending on whether they corresponded to the semantic features of the phonesthemes associated with a target onset cluster. Of the 2,112 responses for the free association Part 1 task (88 words x 24 responses), there were 1,030 hits, a 48.77% strike rate (see Figure 3). Neither the phonesthemic coherence of an onset (according to the corpus analysis) nor the raw number of sound symbolic words beginning with that onset in PDE had a statistically significant bearing on the number of correct associations made by research participants, although the lexically frequent **sl-** and **fl-** onsets, with strike rates of 63.02% and 53.13% respectively, buck this general trend. The strength of **sl**- is also noteworthy in that the phonesthemes related to this cluster concern 'pejorative terms' and the sensory impression of 'wetness', concepts highlighted as being intrinsic to sound-meaning mapping in previous studies (Abelin 1999, 2012, Ramachandran and Hubbard 2001).

Figure 3: Phonesthemic matches per onset cluster in the Part I free association task

The uncontextualised presentation of the words in Part 1 means that neatly categorising the associations into the conventional clang, syntagmatic or paradigmatic[10] classifications is unviable. However, paradigmatic associations are certainly being made, as shown by the 15 associations of *thrack* ('to pack full, fill, cram') with 'hit' or 'beat'. In effect, these are paradigmatic associations at a remove: a clang association is produced because of the echoic rime *-ack*, as in 'smack', 'crack' and 'thwack', and then 'hit' or 'beat' is elicited. Morphological associations also played a part in influencing responses. When words were identified as belonging to a particular word class, there was a strong tendency for associations to be in the same syntactic category. *Clabbed* ('clustered, clumped, coagulated') was identified as a regular past participle and associated with 'hit', 'clubbed' and 'punched'; similarly, *sprent* ('a sprinkler for holy water') was seen as an irregular past participle, prompting paradigmatic associations via *spent* to 'broken', 'finished', 'tired' and 'exhausted'.

When the sound symbolic properties of rime and assonance were seen as complementary, patterns of associative response behaviour were marked. In the cue word *scrunt* ('stunted growth, tree stump'), for instance, the rime *-unt*, found in *grunt*,

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10 Clang associations are those based on similarity of sound rather than meaning, e.g., shop – ship, mope – rope, hat – fat; syntagmatic associations are between words that are syntactically adjacent and frequently co-occur in spoken or written language, e.g., hot – water, spend – time, hermetically – sealed; paradigmatic associations occur with words from the same word class which can be substituted for each other without affecting the grammar of the sentence, e.g., blue – red, cat – dog, end – finish.

runt, *cunt* etc. carries similar connotations to the scrawny and frankly unpleasant nature of the **scr-** cluster, and so was associated by 16 participants with semantic features associated with **scr-** phonesthemes. Stimulus words were often treated as blends of assonance and rime: *snur* ('to snort') is 'between a slur and a sneer', *flade* is 'a flaying blade', blout is 'some kind of disease: bloat and gout'. In certain cases, however, the evocativeness of the rime clearly overrode any sound-meaning mappings associated with a particular assonance – participants used 'stumble', 'bumble', 'rumble', 'jumble', 'fumble', 'grumble', 'tumble' and 'crumble' to describe *thrumble* ('to jostle, squeeze'), not to mention the close rimes 'tremble', 'ramble' and 'thimble'. These findings reinforce the view (Bolinger 1950, Lawler 2006, Rhodes and Lawler 1981, Wescott 1987) that certain rimes carry phonesthemic meaning.

A few cue words had such strong associations with words in contemporary usage that the underlying sound symbolism attached to their onsets was overshadowed. *Sneke* ('a head cold') was associated with 'snake' and/or 'sneak' 15 out of 24 times, although different images were produced: 'to be cunning, underhand', 'move discreetly from one place to another', 'someone who isn't totally honest', 'deceptive person', etc. This even occurred when the obsolete words were associated with decidedly modern concepts, e.g., *stela* ('the stalk of a plant') with beer through 'Stella Artois™', *scruze* ('to squeeze') with 'Scrooge' and *slidor* ('a slippery, miry place') with 'Slytherin', the most sinister house in the Harry Potter series. L2 interference was also a factor: eight out of 24 people said *stofn* ('a stem, or trunk of a tree') sounded German, associating it with 'stollen', a type of fruit loaf, 'stoff' meaning 'cloth', and 'stopfen', 'to stuff'. Similarly, there was interference from French regarding the stimulus word *glise* ('to shine'), participants associating it with 'church' through 'église' and 'slide' through 'glisser' ('slip'), although the association of **gl-** with 'smoothness' may also have contributed to the latter response behaviour.

To summarise, it is difficult to quantify the extent to which matches in the free association task are activated by intrinsic sound symbolism in the stimulus words on account of the vast number of variables involved. Participants may use a word beginning with the same onset cluster to describe the associations that a stimulus word elicits due to clang associations, or what Peirce and Buchler (1955:105–107) and Waugh (1994) refer to as 'diagrammatic iconicity' in the phonestheme. Certainly, the orthographical form is important in in the mapping of lexical items to semantic fields: *skrillen* ('to shriek, scream') and *scrille* ('with a high pitched, piercing sound') both enter the written record in ME (probably via Old Norse) and may even belong to the same word family. However, *skrillen* attracted only six phonesthemic matches because participants associated it with words spelt with a <k>, such as 'skillet', 'krill' and 'skill', whereas *scrille* had 22 correct matches, participants associating it with writing, through 'scribe' and 'script', and thus 'irregular surface movement'.

Part 2 results

In Part 2 of the questionnaire, participants matched cue words to the semantic glosses shown in Table 4. Participants were asked to read all the glosses before looking at the words to mitigate any order effect (Schuman and Presser 1981). There were 612 hits from 2,112 responses, representing a 28.98% strike rate and a mean of 6.95 correct matches per word (see Figure 4). Whereas the Part 2 strike rate is much

lower than that of Part 1, the phonesthemic coherence of each cluster in the Part 2 task was much easier to quantify as responses were unambiguously hits or misses.

Figure 4: Phonesthemic matches per onset cluster in the Part 2 multiple-choice task

The 28.98% strike rate in the multiple-choice task is over three times higher than the chance probability of one out of 11 (9.09%) with even the least coherent clusters, **fl-**, **sl-** and **thr-**, having correct phonesthemic matches at approximately double this rate. However, this probability level is only accurate if each gloss is completely distinct from the others. As a limited number of phonesthemes have overlapping semantic features, e.g., 'movement' or 'negative characteristics', the chance probability of a phonesthemic match was raised from 9.09% to 15%. This follows Kwon (2016:87), who decided on the 15% figure for a stricter statistical testing when investigating phonesthemes in nonsense words. Table 5 shows the results of a one-sample t-test conducted to test mean response figures for statistical significance.

Table 5: T-test results for the percentage of phonesthemic matches per onset in Part 2 (test value = 15.00)

	M	SD	d	t	Effect size[a]
bl-	28.13	33.10	95	3.89***	33.36
cl-	27.48	32.44	95	2.86**	32.70
fl-	17.71	29.00	95	.92	29.23
gl-	36.98	35.72	95	6.02***	36.01
scr-	27.60	35.44	95	3.48***	35.73
sl-	17.71	29.00	95	.92	29.23
sn-	53.13	35.40	95	10.56***	35.68
spr-	27.08	31.56	95	3.76***	31.81

st-	38.54	35.15	95	6.56***	35.43
sw-	28.65	32.23	95	4.15***	32.49
thr-	18.75	26.41	95	1.39	26.62

*p < .05, **p < .01, ***p ≤ .001 (*n* = 96).

a The denominator used in estimating the effect sizes. Hedges' correction uses the sample standard deviation, plus a correction factor.

A statistically significant level of phonesthemic matches was made for eight out of the 11 groups of phonesthemic words in the Part 2 task with the probability of a match raised to 15%. **Bl-**, **gl-**, **scr-**, **sn-**, **spr-**, **st-** and **sw-** are all significant at the 0.001 level, with the **cl-** onset statistically significant at the 0.01 level. Another one-sample t-test confirmed that the mean number of Part 2 phonesthemic matches per participant is also significantly higher (M = 6.38, SD = 2.74) than would be predicted by chance, *t*(95) = 11.02, *p* = <0.001. Participants had a one in 11 chance of making a correct match, i.e., two correct responses from 22 (9.09%). Even when raised to the 15% level (3.3 correct responses), 82 out of 96 participants (85.42%) made more correct matches than chance would predict, the median figure being six out of 22 correct matches.

Cue words which attracted high numbers of phonesthemic matches in both tasks often had a sound symbolic onset and were associated with PDE forms, e.g, *snurt* ('to sneer'), associated with 'snort' (36 out of 48 matches), and *stith* ('to set firmly; unyielding, strong'), associated with 'stiff', 'stitch' and 'stick' (35 out of 48 matches). Nevertheless, there is little clear pattern between the words which have the most phonesthemic matches in Part 1 and those with the most matches in Part 2. Many words attracted phonesthemic matches in one task, but not the other. *Slidor* ('a slippery, miry place') was the best performing **sl-** word in Part 1 with a 21 out of 24 strike rate, but only had two out of 24 matches on Part 2; *swimbil* ('a swaying motion') had only three out of 24 matches on Part 1, but 13 out of 24 matches on Part 2.

One possible reason for the difference between the strength of the onsets in the free association and multiple-choice tasks is that the most coherent clusters in the latter may have a narrower semantic range: **sn-** is literally and metaphorically nasal, **st-** is strong, upright and one-dimensional, and **gl-** relates to light and the eye. **Fl-** and **sl-**, by contrast, have a wider range of connotations and quite diverse phonesthemes. This might result in them being less straightforward to conceptualise, making the matching exercise more difficult.

Combined results

The mean number of correct participant responses across both tasks was 17.1 out of 44: 10.73 out of 22 for Part 1 and 6.38 out of 22 for Part 2, with only eight participants making a greater number of phonesthemic matches on Part 2 than on Part 1. The wide variability in response patterns indicates that there are systematic differences in the way participants react to sound symbolic cue words, and that responses cannot easily be predicted. The total number of correct responses according to onset cluster is illustrated in Figure 5.
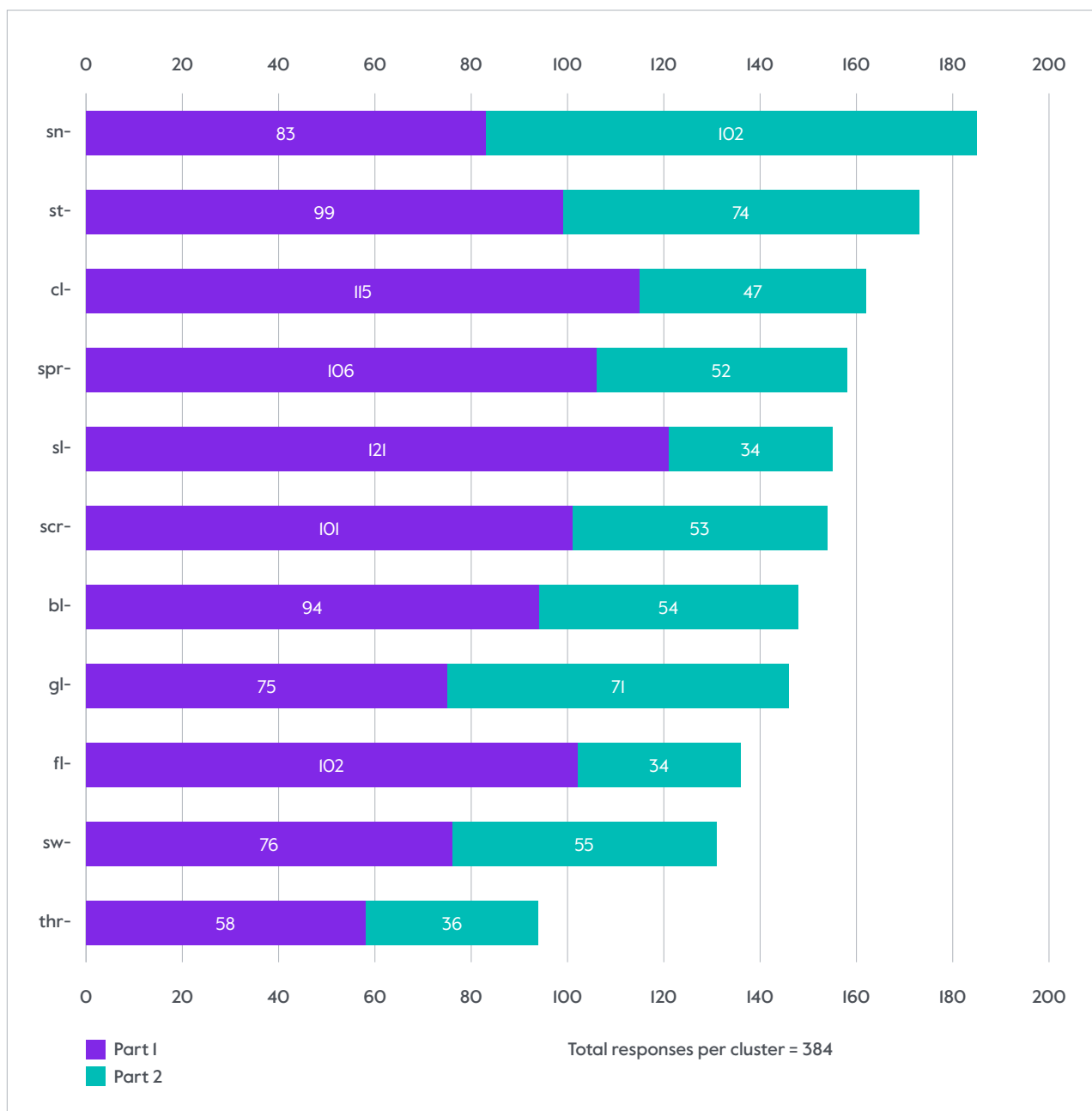
Figure 5: Total number of responses corresponding to each target phonestheme
(*n* = 384)

The level of combined phonesthemic matches for the 11 target onsets is illustrated in Figure 6, with coherence levels ranging from 48.18% for **sn-** to 24.48% for **thr-**. The mean strike rate of 38.87% (1,642 matches from a possible 4,224 responses) indicates that participants associate obsolete words with the concepts they connote at a much higher rate than if there was no link between the phonological properties of words and their meanings. However, the global figures do not reveal the full picture. **Sl-**, with a strike rate of just above 40%, is a mid-ranking cluster according to the total data, yet is the highest scoring phonesthemic cluster in Part 1 and least coherent cluster in Part 2. This suggests that different factors are involved when participants are free to make associations instinctively rather than focusing on matching words to a list of glosses.
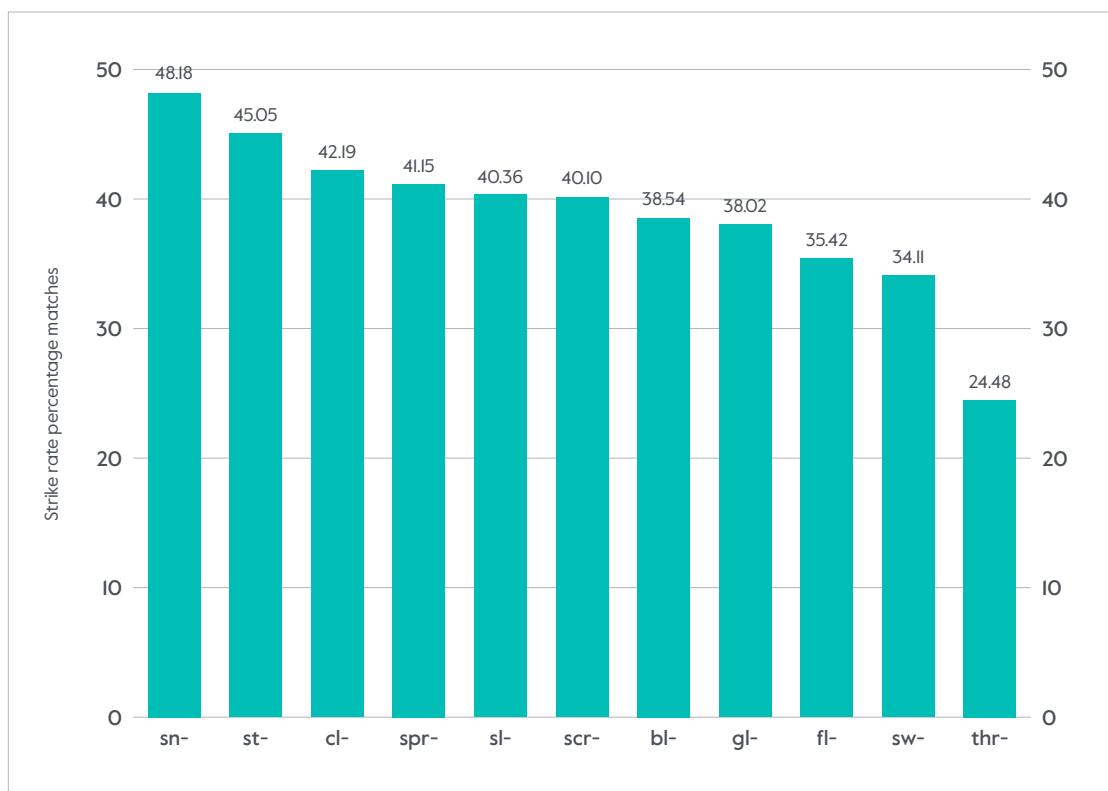
Figure 6: Combined level of phonesthemic matches per cluster

Even so, the global results show that participants connected the proposed phonesthemes with the concepts associated with them more than one in three times for 10 of the 11 clusters across the questionnaires. This is an impressive statistic, and seems to provide strong evidence for non-arbitrary sound-meaning mappings.

Discussion

Both the corpus evidence and the results of the questionnaire show that phonesthemic sound-meaning relations are probabilistic rather than applicable every time a particular sound pattern is encountered. In this respect, their classification as linguistic units is problematic, as they cannot be so neatly categorised as, say, morphemes. Nonetheless, the results of both parts of the study are striking – the frequency with which English monomorphemes with biconsonantal and triconsonantal onset clusters fit into the semantic categories associated with phonesthemes and can be associated with certain concepts cannot be down to chance. These findings may run counter to the orthodox belief in the arbitrariness of the sign, but are consistent with other studies of English phonesthemes, e.g, Rhodes and Lawler (1981), Hutchins (1998), Bergen (2004).

There is some evidence that similarities in the phonemic structure of the onsets can have a bearing on the strength of associative responses. The four most lexically frequent clusters with consonant + /l/, **bl-**, **cl-**, **fl-** and **sl-**, have similar response patterns, attracting two to three times more phonesthemic hits on the Part 1 task than on the Part 2 task. For these clusters, the obsolete words often elicited associations with very common PDE monosyllables with the same onsets in Part 1: 'blue', 'clap', 'fly', 'slide', etc. This may

be indicative of conventionalised sound-meaning mappings due to the frequency of recurrent phonetic patterning in the lexicon, as suggested by M Bloomfield (1895:410) and Rhodes (1994:289). Interestingly, the two triconsonantal clusters in this study, **scr-** and **spr-**, each with the structure /s /+ voiceless obstruent + /r/, also have closely related response patterns (strike rates of 52.6% and 27.6% for **scr-** and 55.2% and 27.1% for **spr-**). However, their high numbers of phonesthemic matches on Part 1 cannot be due to frequency in the lexicon, because these clusters are lexically infrequent. As these onsets also showed highly significant numbers of phonesthemic matches on Part 2, they may be more intrinsically meaningful than some of the consonant + /l/ clusters.

While more research is needed to make definitive conclusions on response patterns like these and on exactly how phonesthemes interrelate, the impact of phonemic form is worth exploring further. Common elements in compositionality in phonesthemic structure may be responsible for overlapping themes, as Hutchins (1998) and Magnus (2000) suggest. For example, the liquid /l/ in the second phoneme position seems to connote 'smoothness' – witness how the smooth consonant + /l/ words contrast with the abrasive consonant + /r/ words in the minimal pairs *blush-brush*, *glaze-graze* and *cloak-croak*.

The phonological properties of onset clusters are unlikely to be the most decisive factor in determining phonesthemic coherence, however. **Sn-** may be mapped more easily to the meaning 'nose' because of some onomatopoeic association between the nose and the voiced alveolar nasal /n/ when **sn-** is articulated, but it would be a stretch to say that **gl-** somehow represents 'light', **st-** 'vertically-oriented solidity' or **bl-** 'colour' because of the way these phonemic combinations are pronounced. Instead, this study supports the position of Jakobson and Waugh (1979:182) and Marchand (1959:157) that certain combinations of phonemes have a natural, intrinsic value that makes them particularly suited to particular concepts within the lexicon.

To sum up, the disparate nature of the associations which participants made with the cue words in the questionnaire should strike a cautionary note when making broad conclusions about phonesthemes. Stimulus words elicited such a diverse range of responses that it seems unwise to attribute these differences solely to phonological or orthographical features integral to the words themselves. It may be that some participants are simply more attuned to sound symbolism than others. Furthermore, as participants were given time to answer each item in the questionnaire, this study does not differentiate between associations which were made instinctively as in priming studies such as Bergen (2004) and Abelin (2012) or those where participants were able to contemplate and rationalise their responses, e.g. Magnus (2000) and Parault (2006).

Conclusion

The corpus evidence confirms that 64% of monomorphemes with biconsonantal or triconsonantal onsets correspond to previously identified phonesthemes in PDE. This indicates that there is systematic patterning in the lexicon, adding weight to Kwon's (2016:89) contention that sound symbolic consonant clusters are meaningful in and

of themselves. Although this research illustrates that different onsets have different levels of phonesthemic strength, initial consonant clusters clearly play an important role in generating associations from unknown words. Research participants were able to make sound-meaning correlations between obsolete words and the majority of phonesthemes in this study (**bl-**, **cl-**, **gl-**, **scr-**, **sn-**, **spr-**, **st-** and **sw-**) to a statistically significant level. These results confirm the psychological reality of these phonesthemes and bolster the argument that they are productive units of language – participants can create associations between unknown words and the concepts embodied in the phonesthemes, as well as recognising the meanings integral to them.

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Appendix I: Coherence levels for different phonesthemes analysed in the corpus study

Cluster	Suggested phonestheme	Example words	Coherence (%)
bl–	excess (too much)	bluster, bling	78.57
	colour (optical properties)	blue, blush	42.86
	compressed fluid	blood, blister	34.29
	swollen, inflated, round	blubber, bloated	31.43
br–	gender roles M	brash, brawn	32.58
	bristly things – one-dimensional connected	brush, bristle	30.34
	gender roles F	breast, breed	25.84
	unpleasant noise	break, brawl	6.74
cl–	adherence, connection	clump, cling	62.82
	impact of coming together	clap, clash	26.92
cr–	bent, crooked	crooked, crab	33.70
	harsh, grating or unpleasant noise	crash, cry	15.22
dr–	liquids	drink, drip	39.13
	pulling along or down	drag, draw	28.26
	having a languid, listless quality	droop, drug	26.09
fl–	inconstancy, insubstantial nature	flimsy, fleece	56.00
	two-dimensional	floor, flat	52.00
	extended, repeated, rhythmic motion	fly, flap	49.33
	lateral movement	float, flow	48.00
fr–	friction, fraying, wispy, insubstantial	fray, fringe	30.77
gl–	light and vision	glow, glance	59.52
	smoothness	glide, glass	19.05
gn–	nibbling, biting	gnaw, gnash	57.14
gr–	negative emotion or complaint	grim, grumpy	51.35
	deep-toned, threatening noises	growl, grind	36.49
	growth	grow, green	9.46
	holding on tightly	grip, grasp	8.11
kn–	three-dimensional convex	knob, knee	55.56
	pinching and squeezing	knead, knock	50.00
pl–	two-dimensional thick	plank, plate	42.86
pr–	human social roles and behaviour	proper, priest	51.72
	one-dimensional extended	prong, prick	24.14
qu–	shake, tremble, wobble	quiver, quake	21.28
sc–/sk–	two-dimensional extended	skim, scorch	53.61
	superficial movement, surfaces, edges or thinness	skin, scan	52.58
scr–	scrapped and scrunched; fragments of the whole	scrap, scruffy	78.13
	extended two-dimensional space + lateral or scrambled movement	scramble, screw	68.76
	unpleasant sounds, irregular movement	scrape, scream	65.63
	two-dimensional extended + one-dimensional motion	screen, scratch	62.50
shr–	shrinking	shrink, shrivel	57.14
	shrieking	shriek, shrill	28.57

sl-	pejorative: lazy, slovenly, careless	slow, slouch	57.14
	downward movement, direction or position	slope, slip	45.71
	liquid/solid interface	slush, slop	34.29
sm-	press close, choke	smother, smoke	36.00
	belittling, insulting, pejorative	small. smear	44.00
sn-	nose breathing, snobbishness, inquisitiveness	sniff, sneeze	63.83
	unpleasant	snort, sneer	61.70
	three-dimensional convex w/ concave (nose)	snub, snout	51.06
	three-dimensional convex w/ concave (fingers)	snap, snip	25.53
sp-	bring to a point; send out or extend from a point	spike, spit	44.87
	rush of liquid	spurt, spew	30.77
	cylinder	spool, spindle	25.64
spl-	one-dimensional to two-dimensional	splay, split	82.35
	to diverge or spread out from a point	splash, splinter	70.59
spr-	extrusion (plant)	sprout, spring	68.42
	to radiate out from a point or to be elongated	spray, spread	68.42
squ-	compression or constriction	squeeze, squash	58.06
	discordant noise	squeal, squeak	19.36
st-	something firm, upright, regular or powerful	stand, steady	72.07
	one-dimensional rigid	stiff, stake	58.56
str-	use of muscles or forceful action in a line; something linear	strain, strike	81.58
	long, thin, stretched out	stretch, stream	60.53
	one-dimensional non-rigid	strap, string	55.26
sw-	smooth. wide-reaching movement	swing, sweep	68.75
	rotary motion, curved path	swoop, swirl	64.58
	oscillate, undulate, move rhythmically to and fro	sway, switch	64.58
	swagger	swagger, swish	18.75
thr-	constricted path	throat, through	50.00
	intense pain or emotion	throb, thrash	36.36
tr-	travel	travel, train	32.94
	a path, walk in a line	trail, trip	22.35
	locomote by foot; step forcibly	tread, tramp	17.65
tw-	to turn, distort, entangle, or oscillate; or the result of this	twist, twirl	55.56
	small sounds or small, chiefly twisting movements	twitch, tweak	51.85
	twisting, spinning, pulling, plucking	twiddle, twang	44.44
wh-	noises of air or breath or forcible movement	whip, whistle	58.93
	rapid movement of air or water	whoosh, whirl	50.00
wr-	twist, distort	wrinkle, wrestle	68.00
	irregular motion; or to twist, turn, or coil	wring, wrap	64.00

Appendix 2: Obsolete words used in the study

Word	Definition	Source*	Word	Definition	Source
bl-			slifor	slippery, deceitful	BT
blat	livid, pale	BT	slike	slime, sludge	OED
bleddren	to become blistered	MED	slor	mud, slime	MED
blee	colour, complexion	OED	sloy	a derogatory term for a woman	OED
bletch	to blacken	OED	**sn-**		
blo	blackish-blue, livid, leaden-coloured	MED	snatted	(of the nose) flattened, snub	MED
blore	loud wailing; loud talking, bluster, bragging	MED	sneke	a head cold	MED
blout	soft, flabby, pliable	MED	snoach	to snuffle; to speak through the nose	OED
blyscan	to be red, shine	BT	snochinge	speaking through the nose	MED
cl-			snur	to snort	OED
clabbed	clustered, clumped, coagulated	MED	snurl	a head cold; a nostril	OED
cleam	smear, cause to stick	BT	snurt	to sneer	MED
cleek	to lay hold of, clutch, grasp, seize firmly	OED	snuve	sniff; snuff	OED
clibbor	adhesive, sticky	BT	**spr-**		
clodder	a clotted or curdled mass	MED	spra	to put forth branches, spring	MED
clomprish	somewhat thick or congealed	MED	spreinen	to sprinkle, scatter	MED
clunch	a lump; lumpen	MED	sprendel	a rod or stick used in thatching	MED
cluppel	a fastening, a coupling	MED	sprent	a sprinkler for holy water	MED
fl-			sprew	to spray	OED
flabel	a fan	OED	sprintle	a shoot, twig	MED
flade	flake of snow	MED	sprittle	a young shoot or twig	MED
flaff	to flap, flutter	OED	spronk	a shoot, sprout	BT
flathe	a skate, ray (fish)	MED	**st-**		
fleme	current of a stream; flight (flee)	MED	staddle	a foundation, fixed place	BT
flett	ground floor (of a house)	BT	stathel	to establish, found, fix, make steadfast	BT
fletting	tangled mass of hair	MED	stela	the stalk of a plant	BT
flewsa	flowing, flux	BT	stith	to set firmly; unyielding, strong	BT
gl-			stofn	a stem, or trunk of a tree	BT
gled	a burning coal	BT	stooth	post, pillar, prop	OED
glemish	a glimpse	OED	stote	to stand still, halt, stop	MED
glent	to be reflected; to gleam, flash	MED	studdle	a post	BT
glifting	staring, gazing	MED	**sw-**		
glise	to shine	BT	swabble	to sway about	OED
glisk	to glance over; to glitter, shine	OED	swaem	a trifler; a vain, foolish person	BT
glout	to scowl, look glum	OED	swancor	bending easily; active or graceful	BT
glusker	one who is squint-eyed	MED	sweak	to swing	OED
scr-			sweel	to swaddle, swathe	OED
scrille	with a high-pitched piercing sound	MED	sweif	a swinging stroke or blow; momentum	MED

scrimman	to shrink, draw up, contract	BT	swelth	a whirlpool	MED
scrogge	a shrub, stunted bush, brushwood	MED	swimbil	a swaying motion	MED
scrunt	stunted growth; tree stump	OED	**thr-**		
scruze	to squeeze	OED	thrack	to pack full, fill, cram	OED
scrynce	withered	BT	thrast	torment, affliction	MED
skrillen	to shriek, scream	MED	threa	to rebuke, chastise; torment, afflict	BT
skrike	to utter a shrill, harsh cry	MED	throht	oppression, affliction, hardship	BT
sl-			thropul	the trachea, windpipe	MED
sleck	mud, ooze	MED	thrumble	to jostle, squeeze	OED
slench	to slink, sneak, go quietly	OED	thrumen	to condense, compress, press in, cram	MED
sletch	to render slack	BT	thrutch	to press, crush, oppress	BT
slidor	a slippery, miry place	BT			

Sources: Bosworth Toller – BT, Middle English Dictionary – MED, Oxford English Dictionary – OED

Appendix 3: Cue words used in each questionnaire

Word set I: bleddren, blee, cleam, clibbor, flabel, flaff, glise, glusker, scrimman, scruze, sleck, sloy, snatted, snuve, sprew, sprittle, staddle, stofn, swancor, sweel, thrast, thrutch

Word set II: blyscan, blout, clabbed, cluppel, fleme, flett, glemish, glent, scrynce, skrillen, sletch, slike, snoach, snur, spreinen, sprintle, stooth, studdle, swabble, sweif, throht, thrumen

Word set III: blat, blo, cleek, clomprish, flade, flathe, gled, glisk, scrogge, scrunt, slidor, slifor, sneke, snurl, sprendel, sprent, stathel, stela, sweak, swelth, threa, thropul

Word set IV: bletch, blore, clodder, clunch, fletting, flewsa, glifting, glout, scrille, skrike, slench, slor, snochinge, snurt, spra, spronk, stith, stote, swaem, swimbil, thrack, thrumble

Questionnaire A

Part 1: Word set I		Part 2: Word set III	
1	blee – colour, complexion	**23**	cleek – to lay hold of, clutch, grasp, seize firmly
2	scrimman – to shrink, draw up, contract	**24**	sneke – a head cold
3	snuve – sniff; snuff	**25**	glisk – to glance over; to glitter, shine
4	glise – to shine	**26**	stela – the stalk of a plant
5	cleam – smear, cause to stick	**27**	slifor – slippery, deceitful
6	sloy – a derogatory term for a woman	**28**	blo – blackish-blue, livid, leaden-coloured
7	sprittle – a young shoot or twig	**29**	sweak – to swing
8	swancor – bending easily; active or graceful	**30**	scrogge – a shrub, stunted bush, brushwood
9	flabel – a fan	**31**	clomprish – somewhat thick or congealed

10	sleck – mud, ooze		32	snurl – a head cold, a nostril
11	bleddren – to become blistered		33	sprent – a sprinkler for holy water
12	scruze – to squeeze		34	swelth – a whirlpool
13	clibbor – adhesive, sticky		35	gled – a burning coal
14	glusker – one who is squint-eyed		36	thropul – the trachea, windpipe
15	staddle – a foundation, fixed place		37	flade – flake of snow
16	thrast – torment, affliction		38	scrunt – stunted growth, tree stump
17	snatted – (of the nose) flattened, snub		39	blat – livid, pale
18	sweel – to swaddle, swathe		40	stathel – to establish, found, fix, make steadfast
19	sprew – to spray		41	sprendel – a rod or stick used in thatching
20	stofn – a stem, or trunk of a tree		42	slidor – a slippery, miry place
21	flaff – to flap, flutter		43	flathe – a skate, ray (fish)
22	thrutch – to press, squeeze, oppress		44	threa – to rebuke, chastise; torment, afflict

Questionnaire B

Part 1: Word set II			Part 2: Word set IV	
1	blout – soft, flabby, pliable		23	clodder – a clotted or curdled mass
2	skrillen – to shriek, scream		24	snochinge – speaking through the nose
3	snur – to snort		25	glifting – staring, gazing
4	glent – to be reflected; to gleam, flash		26	stote – to stand still, halt, stop
5	clabbed - clustered, clumped, coagulated		27	slench – to slink, sneak, go quietly
6	sletch – to render slack		28	blore - loud wailing; loud talking, bluster, bragging
7	spreinen – to sprinkle, scatter		29	swimbil – a swaying motion
8	swabble – to sway about		30	scrille – with a high-pitched piercing sound
9	flett – ground floor (of a house)		31	clunch – a lump; lumpen
10	slike – slime, sludge		32	snurt – to sneer
11	blyscan – to be red, shine		33	spronk – a shoot, sprout
12	scrynce – withered		34	swaem – a trifler; a vain, foolish person
13	cluppel – a fastening, a coupling		35	glout – to scowl, look glum
14	glemish – a glimpse		36	thrumble – to jostle, squeeze
15	stooth – a post, pillar, prop		37	flewsa – flowing, flux
16	throht – oppression, affliction, hardship		38	skrike – to utter a shrill, harsh cry
17	snoach – to snuffle; to speak through the nose		39	bletch – to blacken
18	sweif – a swinging stroke or blow; momentum		40	stith – to set firmly; unyielding, strong
19	sprintle – a shoot, twig		41	spra – to put forth branches, spring
20	studdle – a post		42	slor – mud, slime
21	fleme – current of a stream; flight (flee)		43	fletting – tangled mass of hair
22	thrumen – to condense, compress, press in, cram		44	thrack – to pack full, fill, cram

Questionnaire C

Part 1: Word set III		Part 2: Word set I	
1	blo – blackish-blue, livid, leaden-coloured	23	clibbor – adhesive, sticky
2	scrogge – a shrub, stunted bush, brushwood	24	snuve – sniff; snuff
3	sneke – a head cold	25	glise – to shine
4	glisk – to glance over; to glitter, shine	26	staddle – a foundation, fixed place
5	cleek – to lay hold of, clutch, grasp, seize firmly	27	sleck – mud, ooze
6	slifor – slippery, deceitful	28	bleddren – to become blistered
7	sprent – a sprinkler for holy water	29	swancor – bending easily; active or graceful
8	sweak – to swing	30	scrimman – to shrink, draw up, contract
9	flade – flake of snow	31	cleam – smear, cause to stick
10	slidor – a slippery, miry place	32	snatted – (of the nose) flattened, snub
11	blat – livid, pale	33	sprittle – a young shoot or twig
12	scrunt – stunted growth, tree stump	34	sweel – to swaddle, swathe
13	clomprish – somewhat thick or congealed	35	glusker – one who is squint-eyed
14	gled – a burning coal	36	thrast – torment, affliction
15	stela – the stalk of a plant	37	flabel – a fan
16	thropul – the trachea, windpipe	38	scruze – to squeeze
17	snurl – a head cold; a nostril	39	blee – colour, complexion
18	swelth – a whirlpool	40	stofn – a stem, or trunk of a tree
19	sprendel – a rod or stick used in thatching	41	sprew – to spray
20	stathel – to establish, found, fix, make steadfast	42	sloy – a derogatory term for a woman
21	flathe – a skate, ray (fish)	43	flaff – to flap, flutter
22	threa – to rebuke, chastise; torment, afflict	44	thrutch – to press, crush, oppress

Questionnaire D

Part 1: Word set IV		Part 2: Word set II	
1	blore – loud wailing; loud talking, bluster, bragging	23	clabbed – clustered, clumped, coagulated
2	scrille – with a high-pitched piercing sound	24	snur – to snort
3	snochinge – speaking through the nose	25	glent – to be reflected; to gleam, flash
4	glifting – staring, gazing	26	studdle – a post
5	clodder – a clotted or curdled mass	27	sletch – to render slack
6	slench – to slink, sneak, go quietly	28	blout – soft, flabby, pliable
7	spronk – a shoot, sprout	29	sweif – a swinging stroke or blow; momentum
8	swimbil – a swaying motion	30	skrillen – to shriek, scream
9	flewsa – flowing, flux	31	cluppel – a coupling, a fastening
10	slor – mud, slime	32	snoach – to snuffle; to speak through the nose
11	bletch – to blacken	33	spreinen – to sprinkle, scatter
12	skrike – to utter a shrill, harsh cry	34	swabble – to sway about
13	clunch – a lump; lumpen	35	glemish – a glimpse
14	glout – to scowl, look glum	36	throht – oppression, affliction, hardship
15	stote – to stand still, halt, stop	37	flett – ground floor (of a house)
16	thrumble – to jostle, squeeze	38	scrynce - withered

17	snurt – to sneer	39	blyscan – to be red, shine
18	swaem – a trifler; a vain, foolish person	40	stooth – a post, pillar, prop
19	spra – to put forth branches, spring	41	sprintle – a shoot, twig
20	stith – to set firmly; unyielding, strong	42	slike – slime, sludge
21	fletting – tangled mass of hair	43	fleme – current of a stream; flight (flee)
22	thrack – to pack full, fill, cram	44	thrumen – to condense, compress, press in, cram