Hill-terms in the Place-names of Berwickshire

Volume I

Dàibhidh MacGriogair Grannd
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English Language & Linguistics, School of Critical Studies
College of Arts
University of Glasgow

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Abstract

In *Place-Names in the Landscape* (*PNL*, 1984), Margaret Gelling claims the high number of topographical elements deployed in coining early English settlement-names is a verifiable system that differentiates specific types of hills, valleys, water-features, etc. Thus: *hōh* 'heel' is a hill-spur with a concave scarp falling away from a dip-slope summit; *denu* 'dean' is a long narrow valley with a mostly gentle gradient and moderately steep sides; *ēg* 'island' can signify an area of raised ground in wet country. In collaboration with Ann Cole, Gelling amassed and interpreted over 6,300 examples of topographical settlement-names in a companion volume, *The Landscape of Place-Names* (*LPN*, 2000). These two works propose that an Old English settlement-naming system can still largely be traced in the modern landscape. This thesis examines whether this is possible, not only in England but also in the Scottish county of Berwickshire (BWK) where Old English place-names similarly occur. Focusing on hill-terms, the research seeks to answer whether systematic naming – the 'Gelling-Cole Hypothesis' (GCH) – operated in Berwickshire; if all hill-terms fall within its scope; whether it originated in the earliest Old English period (as asserted); and if statistical analysis can be used to validate it scientifically. Identification of some 2,031 landforms referenced by hill-terms precedes a characterization of their physical attributes using an adaptation of GRASS GIS software (*r.geomorphon*). This automatically generates 11 parameters for each landform without direct researcher intervention. The resulting metrics are compared using a model of statistical hypothesis testing. Heterogeneity between individual place-name elements is examined; a key claim being that synonyms are inadmissible to the naming system. Homogeneity between 1,011 relief-feature examples cited by Gelling and Cole and 490 Berwickshire place-names with equivalent generics is also tested to establish whether the same phenomenon is observable in Scotland. Implicit and explicit assumptions touching upon chronology, causality, and the interaction of historical languages both in Scotland and England are explored towards provisional conclusions regarding the scope and possible origins of topographical settlement-naming.

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Terminology

acclivous — *adj.* 'rising with a slope; sloping (esp. steeply) upward, ascending' (*OED*3). Specifically, a hill-slope viewed from below, often from a settlement or bounding water-feature vs. *declivous* (§5.2.2.1).

co-appellative — *adj.* (neologism), the hypothetical association (<>) between a topographical settlement-name and a proximal landscape feature (§4.2.3).

collocated — *adj*. (neologism), the inferred location of a relief-feature relative to a topographical settlement-name; frequently an unnamed feature that provides the site (*locus*) for a settlement (§4.2.3.3).

complement — *n.* (neologism), a co-appellative settlement-name considered in contrast to an associated landscape feature, and vice versa. For relief-features this can be an identity rather than an actual given name (§4.2.3).

curtailed — *adj*. < *v*. 'to cut short in linear dimension; to shorten by cutting off a part' (*OED2*). A geomorphon computation error due to obstruction (§5.5.1).

declivous — *adj.* 'having a downward inclination; sloping, slanting' (*OED*3) vs. *acclivous* (§5.2.2.1).

distended — *adj*. < *v*. 'to stretch asunder, stretch out, extend; to spread out at full length or breadth' (*OED2*). A geomorphon computation error due to low topographical salience (§5.5.1).

geomorphometry — *n*. 'the science of quantitative land-surface analysis' (Pike *et al.* 2008, 3). See <https://en.wikipedia.org/wiki/Geomorphometry>.

geomorphon — *n*. (neologism), a 'geomorphologic[al] phenotype' (Stępiński and Jasiewicz 2011,109 – see fn. 186). A unit of landscape, equivalent to a *landform* in geomorphometry (§5.2.2).

locus — *n*. 'the place in which something is situated or occurs' (*OED*3); *loci* (pl.). Specifically, the central site or zone of a toponym, expressed as a ten-digit NGR, but occasionally with less precision (fewer digits). Best estimations are flagged by a prefixed asterisk.

mosaic — *v.* < *adj*. 'designating a composite photograph or map, esp. one made up of a number of separate aerial photographs from overlapping areas' (*OED*3); used also of digital map data (§5.3.1).

toponymetry — *n.* (neologism), an investigation of topographical place-names using a geomorphological quantification of landscape. A back-formation from *toponym* (§5.5).

toponymic triage — *n*. (neologism), a process of sifting and documenting which place-names merit inclusion in a study corpus through the application of numerically scored criteria (§4.1).

Abbreviations

alt.	altitude (above sea-level)
Class.	OS feature classification
csv	comma-separated values
DEM	Digital Elevation Model (terrain elevation data from aerial surveying)
df.	degrees of freedom (statistics)
dialE	English dialect
dis.	distance
edn.	edition
en	existing place-name
e14–	early fourteenth century onwards
esp.	especially
fn.	footnote; fnn. (pl.)
gra.	gradient
JSON	JavaScript Object Notation
la14–	late fourteenth century onwards
len.	length
NGR	National Grid Reference (OS)
norm.	normality of distribution
par.	civil parish
per.	perimeter length
pro.	topographical prominence
pn	personal name
rems.	remains of
REELS	Recovering the Earliest English Language in Scotland: Evidence from Place-Names. See: *BWKR* and *REELS* in *Sources*
sur.	surface area
un	unknown place-name
var.cos.	various counties
wid.	width

Symbols

a<>b	*a* and *b* are co-appellatives
a_1, a_2	differentiated identical names in the same parish or county
$a_{\{}$	place-names with multiple hill-terms, loci, or variants in the dataset (§4.2.1.1–§4.2.1.5)
*	hypothetical or reconstructed forms or loci (before NGR)
?	(as a prefix) perhaps
???	unlocated to a county or parish
<	less than; before this date; developed from; URL begins
>	greater than; after this date; developed into; URL ends
∑	a summation-score (in toponymic triage)
~	connected with
≈	cognate with
≤	less than or equal to
≥	greater than or equal to
§	see section
δ	a derivative of [place-name]
#	a number
≠	does not equal

Geomorphon Codes

FL	flat
FS	foot slope
HL	hollow
PK	peak
PT	pit
RI	ridge
SH	shoulder
SL	slope
SP	spur
VL	valley

Language and Dialect Abbreviations

Brit	British (c. 325 BCE–c. 600)[1]
Br	Brittonic (900–c. 1250)
Corn	Cornish (875–c. 1800)
EModE	Early Modern English (1475–1650)
ESc	Early Scots (1100–1450)
Fr	French (1300–)
G	Scottish Gaelic (1200–)
ME	Middle English (1100–1475)
ModE	Modern English (1650–)
ModSc	Modern Scots (1700–)
MSc	Middle Scots (1450–1700)
MW	Middle Welsh (1150–1400)
OE	Old English (650–1100)
OFr	Old French (900–1300)[2]
ON	Old Norse (700–1200)[3]
ONtb	Old Northumbrian (–1100)[4]
OSc	Older Scots (1100–1700)[5]
OW	Old Welsh (775–1150)
P	Pictish (400–?1100)
PrCorn	Primitive Cornish (600–875)
PrCumb	Primitive Cumbric (600–900)
PrW	Primitive Welsh (550–775)
Sc	Scots (1100–)
SSE	Scottish Standard English (1700–)
W	Welsh (1400–)

OS Classification Codes (adapted)

•A•	antiquity
•C•	coastal
•D•	district (a general locality)
•E•	ecclesiastical
•F•	field
•I•	island
•O•	other
•P•	parish
•R•	relief
•S•	settlement
•V•	vegetation
•W•	water
•U•	uncertain classification
•X	documented name[6]
X•	documented location
*X	inferred name
X*	inferred location
^{u}X	undocumented name
X^{u}	undocumented location

[1] PrCorn, PrCumb and PrW are terms used by Gelling and Cole following the Jackson's classification (*LHEB*, 3–6). For clarity in tables, and especially in instances where *PNL* and *LPN* group together these and later differentiated languages and language-stages, Brit will be substituted as a catch-all term. This is done in full knowledge of its proper restriction to their common ancestor before c. 600. The restricted sense applies only to Table 4.7, where sense definitions and the relationship of elements is presented. *Celtic* is also used as a blanket term for insular non-Germanic languages at any stage. *BLITON* (vol. 1, 9–13) provides a useful overview and redefinition of language labels, their relationships, and phases of development. For individual Brittonic languages, this thesis follows *BLITON* unless otherwise stated.

[2] Incorporating 'Anglo-Norman', 'Norman-French', and 'Anglo-French'.

[3] Gelling and Cole's practice of not differentiating Old West Norse (OWN, i.e. Old Norwegian and Old Icelandic) from Old Danish (ODan) is continued here, although specific language labels may be used in quotation from a source.

[4] The northernmost Old English dialect, ancestral to Early Scots and early northern Middle English.

[5] Early Scots and Middle Scots taken as a continuum. The divisions of Scots are adapted from Aitken 1985 (2015).

[6] X stands for any of the other classification codes.

Parish Abbreviations

ABN	Aberdeen St Machar ABD	KDT	Kirkcaldy and Dysart FIF
ASB	Abbey St Bathans BWK	KHP	Kirkhope SLK
AYT	Ayton BWK	LIL	Lilliesleaf ROX
BUP	Bunkle and Preston BWK	LIN	Linton ROX
CHG	Chapel of Garioch ABD	LKK	Ladykirk BWK
CHK	Channelkirk BWK	LGT	Langton BWK
CHS	Chirnside BWK	LAR	Largo FIF
CBP	Cockburnspath BWK	LAU	Lauder BWK
CHM	Coldingham BWK	LEG	Legerwood BWK
CRS	Cranshaws BWK	LMS	Longformacus BWK
CSM	Coldstream BWK	MBT	Morebattle ROX
DFL	Dunfermline FIF	MER	Mertoun BWK
DNN	Dunnichen ANG	MLR	Melrose ROX
DNS	Duns BWK	MRD	Mordington BWK
EAR	Earlston BWK	NEN	Nenthorn BWK
ECC	Eccles BWK	OHS	Oldhamstocks ELO
EDM	Ednam ROX	ONM	Oxnam ROX
EDR	Edrom BWK	PWH	Polwarth BWK
EYM	Eyemouth BWK	SNI	St Ninians STL
FOG	Fogo BWK	STI	Stichill ROX
FOU	Foulden BWK	STO	Stow MLO
FGN	Forgan FIF	SHO	Shotts LAN
GOR	Gordon BWK	SWN	Swinton BWK
GRE	Greenlaw BWK	WRR	Westruther BWK
HUM	Hume BWK	WHI	Whitsome BWK
HUT	Hutton BWK	WTG	Whittingehame ELO

County Abbreviations

ENG	**England (31 March 1974):**		
BDF	Bedfordshire	LNC	Lancashire
BRK	Berkshire	MDX	Middlesex
BUC	Buckinghamshire	NFK	Norfolk
CAM	Cambridgeshire	NTB	Northumberland
CHE	Cheshire	NTP	Northamptonshire
CMB	Cumberland	NTT	Nottinghamshire
CNW	Cornwall	OXF	Oxfordshire
DEV	Devon	RUT	Rutland
DOR	Dorset	SFK	Suffolk
DRB	Derbyshire	SHR	Shropshire
DRH	Durham	SOM	Somerset
ESX	Essex	SSX	Sussex
GLO	Gloucestershire	STF	Staffordshire
GTL	Greater London	SUR	Surrey
HMP	Hampshire	WAR	Warwickshire
HNT	Huntingdonshire	WLT	Wiltshire
HRE	Herefordshire	WML	Westmorland
HRT	Hertfordshire	WOR	Worcestershire
KNT	Kent	YOE	Yorkshire East Riding
LEI	Leicestershire	YON	Yorkshire North Riding
LIN	Lincolnshire	YOW	Yorkshire West Riding

SCO	**Scotland (15 May 1975):**		
ABD	Aberdeenshire	LAN	Lanarkshire
ANG	Angus	MLO	Midlothian
ARG	Argyllshire	MOR	Morayshire
AYR	Ayrshire	NAI	Nairnshire
BNF	Banffshire	ORK	Orkney
BTE	Bute	PEB	Peeblesshire
BWK	Berwickshire	PER	Perthshire
CAI	Caithness	RNF	Renfrewshire
CLA	Clackmannanshire	ROS	Ross and Cromarty
DMF	Dumfriesshire	ROX	Roxburghshire
DNB	Dunbartonshire	SHE	Shetland
ELO	East Lothian	SLK	Selkirkshire
FIF	Fife	STL	Stirlingshire
INV	Inverness-shire	SUT	Sutherland
KCB	Kirkcudbrightshire	WIG	Wigtownshire
KCD	Kincardineshire	WLO	West Lothian
KNR	Kinross-shire		

WLS	**Wales (31 March 1974):**		
AGL	Anglesey	GLA	Glamorgan
BRE	Brecknockshire	MER	Merionethshire
CRD	Cardiganshire	MON	Monmouthshire
CRM	Carmarthenshire	MTG	Montgomeryshire
CRN	Caernarvonshire	PEM	Pembrokeshire
DEN	Denbighshire	RAD	Radnorshire
FLI	Flintshire		

Bear + Wych (Elm) = Berwick

The Coat of Arms of Berwickshire County (later District) Council, 10 October 1890–16 May 1975.[7]

[7] Adapted from original artwork by *Hogweard* (2016) <https://commons.wikimedia.org/wiki/File:Berwickshire_badge.svg>, accessed October 2020. The chaining of the bear is perhaps an allusion by the Lord Lyon to the repeated capture and, in 1482, the final loss to the English crown of the county town of (South) Berwick.

INTRODUCTION

Chapter 1

1.0 Summary

This chapter introduces the 'Gelling-Cole Hypothesis' (§1.2–§1.2.3) and four Berwickshire-related research questions it invites (§1.3–§1.3.4).[8] As a strand within the project, *Recovering the Earliest English Language in Scotland: Evidence from Place-names* (REELS), this thesis is contextualized relative to the recently inaugurated Survey of Scottish Place-Names and within the wider discipline of Scottish and English toponomastics (§1.4–§1.4.2). The study area and general aspects of a solution to labelling languages and language-stages in a Scottish context, adapted from REELS, are described along with the novel methodological approaches that will feature in subsequent chapters (§1.4.2.1–§1.5). This includes the application of specialized software (§1.5.1) and an analysis of the data it generates using a model of statistical hypothesis testing (§1.5.2). Finally, a chapter-summary maps the sequence of research stages (§1.6).

1.1 Toponomastics

Toponomastics (more commonly *toponymy* – *OED2*) is the branch of name-studies that investigates the history and development of place-names to discover what these may reveal about the languages and societies that produced them.[9] By its nature, the subject is

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[8] Pending a full review in Chapter 2, 'Gelling-Cole Hypothesis' (GCH) will be used as a portmanteau term for all the phenomena and ideas pertaining to systematic place-naming as discussed in Margaret Gelling's *Place-Names in the Landscape* (*PNL*) and the companion volume, *The Landscape of Place-Names* (*LPN*), co-authored with Ann Cole.
[9] See Hough (2016b, 3) for a discussion of these terms and an overview of current diversity within place-name research.

interdisciplinary. The fundamental tools of investigation derive primarily from linguistics and history, but conclusions and corroboration from archaeology and geography often augment the range of available evidence, and over the past two decades advances in information technology and the geosciences have created new ways to store, analyse, and visualize place-name data.

This thesis seeks to make an original contribution to these processes of convergence. A technique of landscape classification, developed within geomorphology (§5.2), will be adapted to automatically generate the spatial parameters of specified hills and hill-spurs. These will then be subjected to statistical analysis to test whether the coiners of particular place-names selected one generic element over others because it characterized a distinct type of relief-feature. This would demonstrate for the first time that the phenomenon of systematic place-naming – the 'Gelling-Cole Hypothesis' – can be verified scientifically. And, it is hoped, the present study will perhaps alert interested geoscientists to the potential for collaboration with toponymists, thereby increasing for all relevant disciplines the future availability and precision of analytical tools.

1.2 Systematic Place-Naming

Margaret Gelling's fundamental premise, which she developed with the assistance of Ann Cole, is that the generic elements (§1.2.1) in topographical settlement-names (§1.2.2) were ascribed predictably and relatively consistently by speakers of Old English across most of the territory that eventually became England (*LPN*, xv). The authors claim the large number of terms, used to name settlements by reference to a feature of the surroundings (*PNL*, 1; *LPN*, xii), stems from a rich technical vocabulary that designated sites associated with quite specific types of valleys, hills, water-features, woodland, etc. (*LPN*, xiii–xvi):

> Valleys called **cumb** offered totally different prospects as settlement-sites from those called **denu**; a hill called **dūn** was likely to be the site of a large village, while one called **beorg** might have a single farm or be the site of a church. Many topographical words would convey not just an image of the place but also a wealth of information about the likely size, status and pattern of farming practised by the community living there.
>
> (*LPN*, xiii)

However, *shape* is the salient attribute of raised landscape features that most attracted the attention of name-coiners:

> The shapes of ridges called **hōh** and of those called **ofer** and **ōra**, and the angle of the slopes at those called **clif** and at those called **helde**, are so clearly differentiated that the application of these terms must be regarded as systematic.
>
> (*LPN*, 144)

Appendix O (Vol. II) provides a complete list of the elements discussed in *LPN* and Gelling's earlier volume, *PNL*, which are taken here to illustrate the scope of the GCH.

1.2.1 Generic Elements

Place-names in Britain and indeed elsewhere are very frequently composed of two elements, a *specific* and a *generic*, thus Berwick NTB is derived from (<) $_{\mathrm{OE}}$ *bere* 'barley' + $_{\mathrm{OE}}$ *wīc* 'farm' (*CDEPN*, 52).[10] In this name, the specific element *bere* denotes one particular *wīc*, differentiating it from other settlements incorporating the same generic word for 'farm', e.g. Fishwick HUT < $_{\mathrm{OE}}$ *fisc* 'fish', and Sunwick Farm HUT < $_{\mathrm{OE}}$ *swīn* 'pig'. Single-element names (*simplexes*), comprising only a generic, e.g. Wick, Wicken var.cos. (*CDEPN*, 676–677), are also common. Early Berwickshire simplexes include Duns DNS ?< $_{\mathrm{OE}}$ *dūnas*[11] 'flat-topped hills', and Hume HUM < $_{\mathrm{OE}}$ *hōhum* 'at (the) heughs or spurs of land'. Incidentally,

[10] This may be compared with the punning etymology, *bear* + *wych* (*elm*), depicted by the rebus that appears here as a chapter end mark.

[11] Although alternative etymologies exist for this toponym, these too are simplexes (§4.2.1.3). See Table 4.7 the sense definitions of $_{\mathrm{OE}}$ *dūn*.

both these toponyms happen also to be examples of *hill-terms*, i.e. generics that occur in both compound-names and simplexes, which at their most basic mean simply *hill*.

1.2.2 Topographical Settlement-Names

Until the late 1960s 'so-called nature names' (Ekwall 1924, 59) or 'descriptive names' (Stenton 1924, 36) – the class of place-names Margaret Gelling labels 'topographical settlement-names' – were rated very low on the scale of historical interest (*PNL*, 5). Rather, place-names assumed to chart the earliest settlement in Britain by Germanic, and especially Old English speakers, were deemed to have a greater intrinsic value for scholars. Gelling sums up this position:

> Throughout the history of place-name studies there has been a general assumption that habitative names are likely to be earlier and more important than topographical ones, and that little historical information can be deduced from the latter.
>
> (Gelling 1978, 118)

This bias however was not inevitable. The 'Methods of Place-name Study' in the *Introduction to the Survey of English Place-Names* offers sound precepts for reaching reliable etymologies, including:

> We have previously remarked that a satisfactory investigation and explanation of any individual place-name involves the study of **all the names of the district**. In practice this is not always sufficient, for there are many cases where light is thrown on the origin of a name by the early forms of places in distant parts of the country. [my emphasis]
>
> (Sedgefield 1924, 11)

Sedgefield stops short of extending his reasoning to a consideration of distribution patterns, but some of the seeds of what Gelling later proposed can be found from the very beginnings of the Survey of English Place-Names (SEPN):

> I feel that we should be looking at the general mass of English place-names and thinking about ways of organizing it so that we can appreciate its nature more clearly.
>
> (*PNL*, 3–4)

> Names must in all instances be considered in relation to the landscape, and each of the Old English words involved must be studied on a national, not a regional, basis.
>
> (*PNL*, 6)

Cullen (2013, 162) charting the development of the GCH, examines the 'sometimes derisory attitude towards topographical names' among earlier researchers:

> Stenton's view of 'descriptive' (i.e. topographical) names remained uncharitable in the 1924 EPNS introductory volume: 'It may at once be admitted that the greater number of English place-names tell nothing of importance for social history […] **many place-names of this** [descriptive] **kind are intrinsically trivial**'. [my emphasis; ellipsis original]
>
> (Cullen 2013, 163, fn. 8)

However, restored to its context this quotation shows Stenton's view to be somewhat more rounded:

> The truth would seem to be that place-names arose spontaneously, that the choice of a name was often determined by some local feature prominent enough to men who were preoccupied with the soil, but having no especial significance in the countryside. And although the origin of many place-names may now be inexplicable, there can be no question that the Anglo-Saxons were remarkably sensitive to diversities of ground. If **many place-names of this kind are intrinsically trivial**, they sometimes suggest interesting conclusions when they are studied in groups, when, in particular, it can be shown that certain types of name are characteristic of a particular region. [my emphasis]
>
> (Stenton 1924, 37)

Stenton's complete statement supports aspects of Gelling's later insights, and indeed she quotes from the above in the *Introduction* to her seminal work, *Place-names in the Landscape* (*PNL*, 5). Drawing attention to this same passage and Gelling's reference to it, Padel more recently concludes:

> […] the possibility of subtle shades of meaning among the various Old English words broadly meaning 'hill', 'valley', and the like had been recognised from the earliest days of the Survey of English Place-Names: the existence of several words apparently having broadly the same meaning invites the speculation that they may have been differentiated.
>
> Padel (2017, 449)

However, it must be freely acknowledged that central aspects of pre-1970s research and the resulting publications were skewed by a preoccupation with validating articles of faith concerning early Anglo-Saxon settlement chronology and political geography (Hough 2001, 121).

> In practice […] the landscape of place-names took something of a back seat and attention was focussed on the habitative place-names thought capable of providing insight into social and administrative history.
>
> (Ryan 2011, 7)

Against this trend:

> Gelling is prepared to allow the names to speak for themselves and thereby reveal what mattered to those who coined them, rather than choosing to sift the corpus in the hunt for a few name-types of pre-selected 'historical' interest.
>
> (Cullen 2013, 164)

In 1976, the tide in favour of recognising the significance of topographical place-names began to turn with the publication of Gelling's *The Place-Names of Berkshire*, and Barrie Cox's 'The Place-Names of the Earliest English Records'; the last appearing just as Gelling's *Signposts to the Past: Place-Names and the History of England* was at an advanced state of preparation and so Cox's conclusions are not referenced there (Gelling 1978 (1997, *Introduction*, 6th unnumbered page). Both the Gelling volumes express ideas regarding topographical settlement-names that chime with what Cox had discovered. Surveying Bede's *Ecclesiastical History of the English People* and early hagiographic and charter material, Cox collated and analysed all the place-names recorded before 731 in territories held by speakers of Old English. This corpus of 216 names reveals for the first time that the majority (55%) were 'topographical', compared with the other categories of 'habitation' (31%), and 'district' (14%). Thus, the predominant motivation amongst the earliest coiners of

Old English place-names was a description of the physical setting and the utility of a place rather than a significant building or an eponymous founding group or ancestor.[12]

Margaret Gelling's work has been variously described as a 'revolution' (Hough 2001, 121; Padel 2009, 136–137), and a 'landscape revolution' (Padel and Parsons 2008, viii). Reflecting, perhaps half in jest, on the role she saw herself play in challenging the status quo of the pre-1970s, Gelling (2003, 16) writes: 'Frank Stenton, and my revered tutor Dorothy Whitelock, would have regarded me as a wrecker'.

Amongst the main casualties of this 'fundamental reorientation in the study of Anglo-Saxon place-names' (Ryan 2011, 10) are the SEPN county *Introductions* published before 1976, which as a consequence might be found irrelevant or misleading (Gelling 1978 (1997, new *Introduction*, 7th unnumbered page). Yet, this warning is tempered by Gelling's reassurance:

> …although succeeding decades of critical scrutiny, combined with the accumulation of masses of comparative material, have led to many alterations and modifications to etymologies proposed in earlier volumes, most of them remain valid. There is no question of wholesale repudiation of this basic aspect of the work of the Survey.
> (Gelling 1978 (1997, new *Introduction*, 2nd unnumbered page)

Details of how the pre-1970 chronological certainties of English toponomastics were successfully challenged have been widely explored and commented upon (Cole 2009, 159; Cullen 2013, 161–170; Gelling 1978, 106–109, and (1997, *Introduction*); Gelling 2003, 14–15; Hough 2001, 121; *LPN*, xii–xx; Padel 2009, 135–136; *PNL*, 1–9; Ryan 2011, 8–10). Raising public and cross-disciplinary awareness of these pivotal developments occasioned the commissioning of *Signposts to the Past: Place-Names and the History of England* in 1975 (Gelling 1978 (1997 *Introduction*, 11th unnumbered page). As a result, English place-

[12] Cox 1976 (55–56) actually states the tally to be 224, excluding river-names, which Gelling echoes (1978 (1997), 253; *PNL*,140; *LPN*, xx). The distribution per category is: 'topographical' 119 (53%); 'habitation' 75 (34%); and 'district' 30 (13%). Hall (2012, 108) however uses a tally of 216 place-names ('habitative', 67 names) in calculating survival rates for the names in Cox's corpus.

name studies were brought into the mainstream of contemporary work on the early history of England (*PNL*, 2). This was followed by two inter-related, large-scale studies on topographical settlement-names: *Place-Names in the Landscape* (*PNL*) in 1984, and *The Landscape of Place-Names* (*LPN*) in 2000.[13]

In these last two volumes and subsequent articles, a pervasive system of name-coining was proposed for England, although the actual parameters of this 'Gelling-Cole Hypothesis' are nowhere defined precisely. Instead, a phenomenological approach is employed that seeks to convince by sheer volume of illustrative evidence rather than scientific definition and proof (*LPN*, xv). These publications led to a seismic shift in perceptions, summarized by one reviewer:

> So thorough is the job done by Gelling and Cole that it may be difficult for later scholars to appreciate the full measure of their achievement. Due in large part to their efforts over the last twenty years or so, it is now widely accepted that topographical formations are of the utmost significance in place-names studies, and it is correspondingly easy to forget how little attention had been paid to them until the last quarter of the twentieth century. Both here and in their earlier publications, the authors of *The Landscape of Place-Names* have succeeded not only in rescuing from obscurity this important group of place-names, but in changing the direction of toponymic research.
>
> (Hough 2001, 121)

Its significance, therefore, can scarcely be overstated.

1.2.3 Human Perceptions

Gelling and Cole's research involved fieldwork over many years, recording impressions of landscape subtleties that often cannot be fully appreciated from desk-based research alone

[13] Although the actual text of *PNL* makes no such claim, the paperback editions (1993–) are misleadingly subtitled *The Geographical Roots of Britain's Place-Names*. This embellishment by the publisher is liable to puzzle those interested in Welsh and Scottish place-names as the examination of non-English material is very slight.

(*LPN*, xv). Although industrialization and environmental destruction have radically altered the appearance of a large number of relief-features, especially in more recent times (§6.1.2), the authors claim it is still possible to view the modern landscape and understand how people a thousand and more years ago perceived its characteristics and applied a consistent typology to the naming of nearby settlements (*LPN*, xiv). Hitherto, most researchers (§3.1–§3.1.3.3) attempting to evaluate the system proposed by Gelling and Cole have sought to replicate their original methodology. In the case of hills, this entails subjective comparisons using map contour-line patterns and drawings prepared from photographs taken in the field. It is relatively straightforward, although labour-intensive, to extend this manner of investigation to additional areas, and to collate and compare values for a predetermined range of parameters across features sharing a given generic element.

And yet, as outlined, this procedure is questionable. Is it good science to rely upon the value judgements of a single investigator, no matter how experienced, in determining the operation of a phenomenon of this kind, notwithstanding the fact that the object under investigation (the system) is itself the product of subjective perceptions? Prior knowledge of the name given to a relief-feature could lead investigators into a circular argument. Reflecting upon Gelling and Cole's elastic definition of OE *dūn* (*LPN*, 164–167), Pratt (2005, 94 – §4.1.1.3) comments '[it was] usually easy to find something that matched in the area'. For value judgement-based research to have greater methodological rigour, it would be necessary to assemble a sizeable cohort of observers, trained in the subtleties of (say) Old English naming practices, who would independently differentiate hills into sets on the basis of shape alone without knowing their names; it being statistically improbable that multiple observers would consistently agree unless a naming system were actually present. Such a study – analogous to blind randomized clinical trials in medicine – would require resources far in excess of those usually available for toponomastic research. Somewhat in anticipation of the fourth thesis question (§1.3.4), it should be noted that replicability of researcher methods and results is a fundamental aspect of hypothesis testing in general.

The present study, whilst not ignoring or downplaying name-coiner perceptions in the processes of naming, aims primarily to determine whether its systematic nature can be demonstrated objectively by *controlling* (in the experimental sense) for potential researcher bias. The focus throughout therefore is not a closer definition of name elements, although these are examined to ensure the data compared are genuinely comparable (§7.5), but a confirmation or otherwise that settlement-naming relative to terrain can indeed be deemed systematic. An evaluation of human perception *per* se is not an objective of the current research as may be readily concluded from the type of evidence presented in Vol. III.

1.3 Research Questions

As *Recovering the Earliest English Language in Scotland: Evidence from Place-names* (§1.4.2) is the first large-scale examination of a single Scottish county to focus on Old English place-names in depth, there now exists a fresh opportunity to explore whether Gelling and Cole's statements regarding Old English naming patterns might also be valid in Scotland. In this, Berwickshire offers both a *control* for testing the hypothesis, whilst the actual examples cited in *LPN* provide a *canon* against which to measure the possible operation of the phenomenon in an area outwith England.

Inspiration for this thesis has come largely from the tentative suggestions made by the authors of the GCH regarding its operation and possible origins. Previous attempts to investigate it (§3.1–§3.1.3.3) have driven the various methodological approaches that will be used; a particular debt is owed to Tehri Nurminen's unpublished PhD thesis, 'Hill-terms in the Place-names of Northumberland and County Durham' (*HPND*), which provided the original catalyst for the present research and inspired its title.

Two overarching themes feature throughout the following investigation: the close definition of parameters and terms, and the role of the researcher as a factor within hypothesis testing of this nature. These aspects combine to precipitate four fundamental and interrelated research areas:

1.3.1 Does the Gelling-Cole Hypothesis operate in Berwickshire?

> The material collected for the present study gives rise to a number of interesting questions which would provide fruitful avenues for future research. One question naturally arising from the findings is that of how the patterns observed in the study area compare with the neighbouring counties and southern Scotland. This question could only be satisfactorily answered after similar studies had been completed for these areas.
>
> (*HPND*, 317)

This thesis is a direct response to the question Nurminen poses. Whilst a complete recapitulation of *HPND*'s methodology (§3.1.3.1; §3.1.3.2) will not be attempted here, the principle of creating metrics to facilitate the quantification of hill-shapes will be adopted and adapted. Berwickshire accounts for a significant portion of the Old Northumbrian dialect zone and so might be expected also to manifest systematic naming, which *HPND* concludes has operated in the place-names of north-eastern England.

1.3.2 Which hill-terms fall within the scope of the Gelling-Cole Hypothesis?

Previous studies have not sought to examine whether all or only specific hill-terms are deployed systematically in the manner proposed by Gelling and Cole. Moreover, the range of senses individual elements can connote (see Table 4.7) raises doubt that a pervasive system may operate at all, since a key requirement would be an unambiguous differentiation of categories. Gelling is unequivocal that within the 'model' synonymous elements are not permissible (*LPN*: xiii), but how far is polysemy a feature? Is it possible to differentiate elements that always describe geomorphological perceptions from other naming motivations?

1.3.3 Is the Gelling-Cole Hypothesis a uniquely Old English phenomenon?

LPN appears to contain contradictions with regard to when and where the GCH may have originated and as to which language(s) and language-stages are its concern. Definitive conclusions are beyond the scope of present research as the prerequisite for such an investigation would be a detailed survey of historical naming practices in related and unrelated languages of Britain and neighbouring parts of western Europe. Instead, the persistence of systematic naming in Older Scots, as the successor to Old English in Scotland, may – if verified – provide the basis for initial observations that would have implications for the possible origins of the GCH.

1.3.4 Can the Gelling-Cole Hypothesis be objectively validated through statistical analysis?

Although not labelled overtly as a hypothesis, the provisional application of this term to Gelling and Cole's conclusions may itself be tested by adopting an empirical method. In effect, this emulates the phenomenological approach of *LPN* itself (p. xv) – just as the large volume of examples presented for each generic element attests the existence of an underlying system, so the establishment of statistical relevance would confirm the applicability of the term *hypothesis* to describe such phenomena.

1.4. Thesis Context

The availability of reliable published sources, such as the SEPN county surveys, is critical to a synthetic investigation of place-names (*LPN*, xxiii). The following five subsections describe the context of the present study within the broader discipline of Scottish and English toponomastics. Berwickshire, the main study area, is also defined. This overview is intended to highlight the interrelationship between the main previous attempt to create a national place-name survey for Scotland – of which *The Place-Names of Berwickshire* (*PBWK*) was the only county volume – and the current Survey of Scottish Place-Names (SSPN), which is the context of this thesis, REELS, and a series of major research projects that began in 2006.

Such a close relationship to SSPN and SEPN, both of which are incomplete, will therefore reflect the incidence of topographical settlement-name elements only in selected areas of Britain. Nonetheless, the gargantuan task of completing whole county surveys, now approaching its centenary in the case of England, is sufficiently advanced to begin to investigate cross-border questions such as whether the GCH has operated in a southern Scottish county, as Nurminen enquires (§1.3.1).

1.4.1 The Survey of Scottish Place-Names

In general, Scotland's historical sources are sparse and relatively late in comparison with the happier situation that obtains for our neighbours south of the Tweed. Centuries of warfare along with calamitous periods of political and religious upheaval have destroyed many of the documents and artefacts that would undoubtedly have illumined a great deal more of our past. Often place-names offer the oldest – and sometimes only – surviving evidence for historic cultural, political, social, and economic practices, and land-management institutions.

A comprehensive investigation of all place-names, therefore, is absolutely crucial for beginning to understand the complex history and decline of the languages once spoken in Scotland (Taylor 1998, 1).

Acknowledgement of the potential for toponomastics to bring light to areas where other sources have been lost was pivotal to the establishment of the Scottish Place-Name Society / Comann Ainmean-àite na h-Alba (SPNS) at the University of St. Andrews on 17 February 1996. The Society's newsletter makes clear from the beginning that its membership is to comprise both full-time academics and those members of the general public 'who find place-names an enduring fascination, giving a special insight into many facets of our history and culture' (Fraser 1996, 1). For almost a quarter of a century, SPNS's activities have brought together an international community of researchers into Scotland's place-names. Its various activities have included regular conferences at venues across the country, a printed biennial newsletter, and endorsement of *The Journal of Scottish Name Studies*, established in 2007.[14]

In parallel with the activities of SPNS, two projects funded by the Arts and Humanities Research Council, 'Gaelic in Medieval Scotland: The Onomastic Evidence' (2006–2010) and 'Scottish Toponymy in Transition' (2011–2014), initiated a national place-name survey in all but name. The first supported the research and publication of *The Place-Names of Fife* (5 vols.) The last contributed two further county surveys, *The Place-Names of Kinross-shire* and *The Place-Names of Clackmannanshire*, one district survey (Menteith PER), and prepared the ground for three further district surveys (Cunninghame AYR, and two groups of contiguous Berwickshire parishes).[15] The Berwickshire material comprised the study area of Leonie Mhairi Dunlop's doctoral thesis 'Breaking Old and New Ground: A Comparative Study

[14] Digitally published from 2012 (vol. 6–), <http://www.clanntuirc.co.uk/JSNS.html>.
[15] For a more detailed overview of 'Scottish Toponymy in Transition', see Hough 2012b, and <https://www.gla.ac.uk/schools/humanities/research/celticgaelicresearch/researchprojects/stit>.

of Coastal and Inland Naming in Berwickshire' (*BONG* – the parishes of Abbey St. Bathans, Bunkle and Preston, Cockburnspath, and Coldingham – §3.2.3; §4.4–§4.4.2), and four of the six parishes of REELS (Coldstream, Hutton, Ladykirk, and Mordington – §1.4.2).

A long-held desideratum, to parallel the ambition that has now successfully published county volumes for much of England, led ultimately to the founding of the Survey of Scottish Place-Names / Suirbhidh Ainmean-àite na h-Alba / Surveance o the Place-Names o Scotland (SSPN) at the University of Glasgow on 3 November 2016. Although founded officially at that time, the county volumes since 2006, modelled on and including *The Place-Names of Fife*, are counted retrospectively within the Survey (*PNKNR*, ix). SSPN sits currently as a project affiliated to SPNS.

By way of contrast, the far-sighted creation of the English Place-Name Society (EPNS) in 1923, inaugurated with the aim to undertake and publish a survey of every English county, initially at the rate of one per year, has long benefitted the study of place-names in England and historical research more generally. It provides a supervisory role to SEPN and appoints a director to oversee and co-ordinate the editors of county volumes. To date, SEPN has completed 24 of the 39 historical counties and shires of England with the remaining 15 partially published or underway.[16]

1.4.1.1 *The Place-Names of Berwickshire*

Scotland could have enjoyed toponomastic foundations as early as those of SEPN, had the ambitions of the Royal Scottish Geographical Society (RSGS) been realized from 1938. In his *Introduction* to the first and only publication of the RSGS 'survey', *The Place-Names of*

[16] 'History of the English Place-Name Society' and 'The Survey of English Place-Names'. <https://www.nottingham.ac.uk/research/groups/epns/index.aspx>, accessed October 2016.

Berwickshire. *The Place-Names of Scotland Series, 1* (*PBWK*), John Mathieson, Convenor of the Place-Names Committee, announces the Society's intention to collect 'the Place-Names of Scotland by counties, in a manner similar to what is being done in England' (p. 3). Thus, *PBWK* represents a significant strand in the pre-history of both REELS and the twenty-first-century Survey of Scottish Place-Names. Efforts by RSGS to create a national survey and the contribution of the Berwickshire volume's author, the Rev. James B. Johnston, are explored in '*The Place-Names of Berwickshire* and the Royal Scottish Geographical Society's "Survey of Scottish Place-Names", 1938-1954' (Grannd, in preparation). *PBWK* will be evaluated in reviewing previous publications about Berwickshire place-names (§3.2.1), and also used a source (where applicable) in constructing the main Berwickshire datasets (§4.5).

1.4.2 Recovering the Earliest English Language in Scotland: Evidence from Place-names

REELS is a three-year (2016–2019) Leverhulme Trust-funded project, based at the University of Glasgow.[17] The main outputs are: i) *The Berwickshire Place-Name Resource* (BWKR) – a publicly accessible website collating and analysing all Berwickshire place-names from Ordnance Survey 1:50,000 scale maps;[18] ii) *The Place-Names of Berwickshire Volume 1: The Tweedside Parishes* (*PNBWK1*) – a part-county survey analysing six of Berwickshire's 32 civil parishes in depth (Coldstream, Eccles, Foulden, Hutton, Ladykirk, and Mordington); and iii) this thesis. *PNBWK1* will be the first SSPN volume to survey south of the Forth-Clyde isthmus.

[17] See Hough 2015 for a more detailed overview of the project.
[18] BWKR <https://berwickshire-placenames.glasgow.ac.uk> was launched at a joint conference of The Scottish Place-Name Society and The Scottish Records Association on 17 November 2018.

1.4.2.1 Language Labels

Language and Dialect Abbreviations (p. xvi) illustrates the range of languages and possible linguistic contacts that have contributed to the formation of place-names throughout the length of Britain. The number and historical sequence of Celtic and Germanic languages, found in every region of Scotland, is far more complex than elsewhere. Place-names originate in or have been transmitted via: Brittonic, Pictish, and **Gaelic**; Old English, and Old Norse (and its successor, Norn); and **Scots**, **Scottish Standard English**, and **Modern English** (those in bold continue to be spoken vernaculars). Such complexity presents challenges of interpretation and labelling, stemming largely from the existence of cognates in closely related languages (as grouped above), and because of frequent uncertainty regarding the time depth of elements for a given name due to the absence of early sources.

Let one example, *bank*, illustrate the problem. Middle English of a northern variety heavily influenced by Old Norse was introduced from the mid-twelfth century into the newly founded Scottish burghs by immigrants from central and northern England (*CSD2*, x). Ultimately, their speech became a major component of Scots. Yet the core vocabulary and grammar of Scots comes directly from the spread into southern Scotland, around 650 years earlier, of Old Northumbrian, the northernmost Old English dialect. The element *bank* in a Scottish place-name has its roots ultimately in Old Norse, but to label it such or even as Middle English would be misleading in a Scottish toponym. The earliest sources recording this element date from 1380 (*DOST* s.v.) – the early period of Older Scots. Yet, if pre-1700 evidence for a given name is unavailable, a toponym in *bank* could conceivably have been coined in Modern Scots, Scottish Standard English, or even Modern English.

Ambiguities of this kind are further compounded by the nature of extant sources, many of which post-date, perhaps by centuries, the origin of the names for which they are the earliest evidence. Furthermore, the sociolinguistic context that produced and preserved historical forms can negatively impact the accuracy of names coined in other languages. The main early Scottish sources are in Latin and, later, Older Scots; none are available in Brittonic or Pictish and very few early Gaelic manuscripts of any kind have survived, despite the vast majority of Scottish place-names having been coined in – or transmitted orally via – Celtic languages. Also, all but the commonest and most widely known place-names are seldom found in multiple early sources and this precludes too great a reliance being placed upon a single historical attestation.

In many cases, a conclusive language of origin is unproven and unprovable. Without direct evidence or inference based on the other elements, with which a generic is compounded, the best that can be achieved is to signal the earliest definite language-stage in each case; although in reality a particular name may have a much earlier history than such labelling appears to imply. As SSPN progresses, and hopefully wider patterns and regional characteristics of hill-terms emerge, general insights about the mass of names may counter the current lack of corroboration for individual toponyms. This thesis, therefore, following the lead of REELS, takes a pragmatic and provisional approach to labelling etymological elements. Unless there are strong grounds for concluding an earlier origin – most usually through direct parallels elsewhere with comparative names which *are* supported by early sources – the language or dialect label prefixed to elements is a statement of the earliest attestation. The most common language continuum for Berwickshire, thus divided by date, is labelled:

650–1100 = Old Northumbrian English (OE)

1100–1700 = Scots, i.e. Older Scots (OSc), subdivided by this study into:

- 1100–1450 = Early Scots (ESc)
- 1450–1700 = Middle Scots (MSc)

1700– = Scottish Standard English (SSE) or Modern Scots (ModSc)

Usually, since neither orthography nor context unambiguously indicate Modern Scots as the language of origin, names that are genuinely Scots may be misclassified as the variety of Modern English spoken in Scotland (SSE) due to a lack of earlier sources or contrary evidence. Thus, elements in the above continuum occurring after 1700 are labelled by default as Scottish Standard English unless proven to be Modern Scots.

Given this dilemma, subsequent chapters will label individual elements as pertaining to specific languages or language-stages only as a statement of their current earliest confirmed attestation. When elements within linguistic continua are being tested for their systematic application to landscape features, they will not be differentiated by such chronological labelling (§5.5.2).

1.4.3 The Study Area

Berwickshire is the south-easternmost historical county of Scotland, bounded to the north-east by the North Sea, contiguous with Roxburghshire, Midlothian, and East Lothian to the south, west, and north, and with the English county of Northumberland to the south-east. For current purposes, Berwickshire is the lieutenancy area of that name, co-extensive with the local government area abolished on 16 May 1975.[19] The historical county has an area of 1,194 km^2 / 461 square miles (*Gaz. Scot.*). In keeping with the emerging standard for Scottish place-name surveys (Taylor 2016, 69, fn.1; 78), the civil parishes and county divisions as they existed at abolition are used throughout this study. This also implements Gelling's recommendation, as one of the co-creators of a UK-wide system of county abbreviations (§2.2.1): 'I am convinced that historians whose work is based on regional studies must continue to use the framework of the pre-1974 counties' (*PNL*, 9).

[19] Local Government (Scotland) Act 1973.

Fig. 1.1. Berwickshire civil parishes and neighbouring counties.[20]

[20] Satellite Map Tiles © Esri. (Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community).

Traditionally, Berwickshire was regarded as having two approximately equal halves: (*The*) *Merse* to the south-east – the most fertile swathe of agricultural land in Scotland – comprising the Tweedside parishes and their low-lying hinterland; and to the north-west *Lammermuir* or *The Lammermuirs*, a zone of hilly moorland rising towards the watershed that defines for the most part the boundary with East Lothian (*OGS* iv, 452; v, 28).

The south-western portions of the Merse and Lammermuir, comprising the catchment basin of the Leader Water within Berwickshire, formed a third traditional division, *Lauderdale* (*Geog. Coll.* iii, 170; *OGS* iv, 475). *Merse* could also designate Berwickshire as a whole, and even include Northumberland as far south as the Cheviots, as well as all of Roxburghshire excluding Liddesdale (i.e. *Teviotdale*). Similarly, *Lammermuir* could also refer to the upland district of East Lothian north-west of the watershed. These traditional divisions are reflected in the titles of two of the earliest maps of the county: 'Mercia, vulgo vicecomitatus, Bervicensis' (*Blaeu (Pont) Mercia*), and 'Laudelia sive Lauderdalia Scotis, vulgo, Lauderdail' (*Blaeu (Pont) Laudelia*).

1.5 Research Methodology

For conclusions regarding variance or congruence between sample groups to be statistically valid, the quality of data must be rigorously controlled. Essentially, poor sampling cannot deliver reliable conclusions. Therefore, in developing two large corpora for comparison – one for Berwickshire and another for England based on *LPN* – the processes of evaluating and validating data will be fully documented and transparent. Since both the compilation stages and final results are available in the *Appendices* (Vol. II), future researchers wishing to access this material will be able to retrace every decision leading to the inclusion or exclusion of a toponym.[21]

Methodology and Berwickshire Corpora (Chapter 4) pilots an adaptation of *HPND*'s corpus validation process in a re-evaluation of data from earlier research of the GCH in Scotland (Pratt 2005). This procedure, termed *toponymic triage*, is then expanded to six stages to screen Berwickshire material collated from a variety of sources . A key touchstone is Table 4.7, which synthesises sense definitions from a range of dictionaries and element vocabularies to differentiate toponyms as *admissible* or *inadmissible* to the testing corpus.

Initially, place-names are extracted from the *REELS* database and provisionally divided into two datasets according to the suspected presence (REELS1) or absence (REELS 2) of hill-terms. REELS1 is then triaged and inadmissible names transferred to REELS2. The final version of REELS1 represents the core Berwickshire corpus (BWK1). Place-names additional to BWK1 are then added from triaged corpora compiled from previous studies that have investigated Berwickshire: 'The Non-Celtic Place-Names of the Scottish Border Counties' (*NPSB*); 'Breaking Old and New Ground: A Comparative Study of Coastal and Inland Naming in Berwickshire' (*BONG*); and *The Place-Names of Berwickshire* (*PBWK*). In each case, a clear *audit trail* is left so that any toponym can be traced back through the processes of sifting from the final corpus to the original source. This rigour is directed especially towards investigating the fourth research question (§1.3.4), but it is also fundamental to establishing the evidential base of the other three.

A particular focus of toponymic triage is the articulation of a premise within the GCH that settlements and topographical features form a relationship of two halves or *complements* (§4.2.3) with each comprising a name (explicit or implicit) and two geographical places. This

[21] The *Appendices* are designed to replicate on paper the tables of a (digital) relational database, which uses common identical fields to link dataset tables. This inevitably sacrifices brevity for utility.

allows a fourfold classification of the research process to be recorded *in medias res* as a location and name for both complements is variously identified or determined. These four decisions are recorded as a co-appellative code (§4.2.3), and ultimately the completed corpus can be ranked and segmented according the availability of information and whether degrees of inference have played a role.

Identifying the correct eponymous relief-feature is critical to being able to generate metrics as evidence of systematic place-naming. Where the terrain (locus) is unambiguous or convincingly adduced, parameters of hill extent, altitude, and area, for Berwickshire toponyms, will be generated using bespoke software. These allow relief-features, grouped by the generic elements in their names, to be compared, and for heterogeneity – as predicted by the GCH – to be established or refuted by statistical hypothesis testing.

As *LPN* already provides voluminous evidence of settlements and relief-features grouped by generic, it is relatively straightforward to construct a *LPN* corpus and, in most instances, to locate and classify the hills cited as exemplary. Once again, this precedes a profiling of the actual terrain using computational software; the objective being to make a comparison between generic groups the GCH predicts to be dissimilar. And finally, a direct statistical comparison between the corpora of *LPN* and Berwickshire is undertaken to find whether Berwickshire material with comparable hill-terms is homogenous with the relief-features selected to illustrate *LPN*. This aims to establish whether the GCH is likely to operate in Berwickshire – the first research question (§1.3.1). The processes of preparing, profiling, and computing hill-term data address the second research question – whether all hill-terms fall within the scope of the GCH (§1.3.2). Chapter 2, which examines facets of Gelling and Cole's definition-by-demonstration, looks to explore the scope and possible origins of systematic place-naming – the third research question (§1.3.3).

1.5.1 Software

The software (*Geomorphon Profiler*), used to generate the parameters of individual relief-features, is an adaptation of *r.geomorphon* – a digital tool (plug-in) integral to GRASS GIS, Version 7.9 (2020). Original software (*Place-Name Props*), which co-ordinates and visualizes the outputs of *Geomorphon Profiler* (see Fig. 5.4), was also created for the present study. The role of the doctoral candidate in software development was confined to: an original identification of *geomorphons* (§5.2.2) as a possible solution; the specification of desired metrics and output formats; and a review of outputs from successive iterations. All technical expertise and the research fundamental to creating working applications were the *pro bono* contributions of a professional software engineer, Denis Ovsienko <denis@ovsienko.info>. Further details including URLs of the digital information and software used are detailed under *Map Data Sources* and *Resources* (pp. 369–370).

1.5.2 Statistical Analysis

A central premise of the current study is that the phenomenon of systematic place-naming discovered and illustrated by Gelling and Cole is a hypothesis in all but name, and that through the application of statistical hypothesis testing this assumption can be confirmed or refuted . Although a wide range of statistical methods is available, the Kruskal-Wallis Test has been chosen as being the most appropriate for the kind of data and analysis required (§5.5.2.1).

A sequence of three stages, considered good practice in statistical hypothesis testing, will be followed: i) definition of the question to be tested; ii) a formal statement of the status quo (the *null hypothesis* – H_0) with its opposite (the *alternative hypothesis* – H_1), and of a numerical value (*level of significance*) chosen to calibrate the sensitivity of the test (which also equates to a percentage expressing a *level of confidence* in the accuracy of the result); and iii) analysis of the data relative to a numerical value (*alpha* / *α*), which constitutes the threshold for either 'not rejecting the null hypothesis', or 'rejecting the null hypothesis' and thereby accepting the alternative hypothesis. Thus, the definition of proof is numerically pre-defined and verifiable by others.

The advantage of a statistics-based approach is that the criteria for validation are clear and precise and the degree to which a result is marginal or significant is quantified. Furthermore, the nature of the process of analysis is such that the outcome is wholly unpredictable. This combined with the *unsupervised* (§5.0) method of data generation means the processes of measurement and testing described in Chapters 5 and 6 are easily replicable and relatively free of researcher bias.

1.6 Thesis Plan

This ***Introduction*** (Chapter 1) has established the basis of current research within a broader context of the national place-name surveys of England and Scotland. It has also contextualized and demonstrated the significance of the core texts, *Place-Names in the Landscape* and *The Landscape of Place-Names*, which construct and illustrate the central hypothesis concerning topographical place-names that will be examined in relation to Berwickshire. The novel methodological solutions to be applied towards answering the four research questions in subsequent chapters have been sketched along with a definition and description of the study area.

The Gelling-Cole Hypothesis (Chapter 2) explores Gelling and Cole's statements about how, where, and when systematic topographical place-naming may have evolved. This process is central to answering whether the Gelling-Cole Hypothesis is indeed a uniquely

Old English phenomenon (§1.3.3). It emerges that a prerequisite for testing will be a re-examination of several (mostly implicit) assumptions which have remained largely unchallenged hitherto.

Research Context (Chapter 3) reviews three previous studies that seek to recapitulate the principles of Gelling and Cole's methodology and identifies aspects that are useful for the present investigation. Clarification of what is a legitimate test of the GCH also considers the complex linguistic history of southern Scotland. Previous studies, which have investigated Berwickshire place-names, are also reviewed and evaluated. Information from these will be repurposed and combined with *REELS* data to create the Berwickshire datasets upon which the remainder of the thesis is based.

Methodology and Berwickshire Corpora (Chapter 4) develops and applies a consistent system for ensuring only examples validated as containing hill-terms are used to test the GCH. Following a piloted proof of concept, a revised selection process (*toponymic triage*) will be applied to data extracted from Berwickshire sources, three of which are reviewed in Chapter 3. This generates two audited corpora and records the justification for corpus inclusion of each toponym. This process also permits the segmentation and further evaluation of the resulting datasets to reduce to a minimum any potential for researcher bias.

Toponymetry (Chapter 5) briefly reflects upon the perceptual and philosophical considerations that arise from dividing the landscape into named units before introducing an adapted geoscientific technique that allows *landform*-boundaries (§5.2.1) to be determined using software. This is preparatory to computing the values of 11 spatial parameters for the relief-features that have inspired Berwickshire topographical settlement-names. These quantitive data are then subjected to calculus-based hypothesis testing to show whether named landforms are differentiated in the manner the GCH predicts.

A Landscape of Hill-Names (Chapter 6) gathers together all of the examples cited for selected generic elements in 'Hills, Slopes and Ridges' (*LPN*, 143–219) and computes their parameters in the manner applied to Berwickshire hills and hill-spurs in Chapter 5. The purpose of this is twofold. Firstly, for the systematic naming to be proven, the compared attributes of *LPN* relief-features, grouped by hill-term, should exhibit a heterogenous statistical relationship. Secondly, by comparing paired hill-term groups from Berwickshire and the 'canonical' hills of *LPN*, a homogenous statistical relationship should emerge if the Gelling-Cole Hypothesis operates north of the River Tweed.

Research Conclusions (Chapter 7) reviews the accrued evidence and conclusions relative to the research questions (§1.3.1–§1.3.4) and translates the results of statistical analyses back into more conventional toponomastic language. This includes reflection upon the shortcomings and challenges encountered in using the adopted methodologies.

And finally, ***Future Research*** (Chapter 8) sketches a series of six potential directions for further development and investigation that have emerged from this study.

THE GELLING-COLE HYPOTHESIS

Chapter 2

> The key to Anglo-Saxon topographical naming lies in the precise choice of one of the many available words for streams, marshes, roads, valleys, hills, woods and farmland, and the concept which underlies both the 1984 book and the present one is that much of the precise meaning of these terms can be discerned by study of the names in relation to the existing landscape.
>
> (*LPN*, xiv)

2.0 Summary

This chapter seeks to define the phenomenon of systematic topographical settlement-naming as commented upon and abundantly illustrated by Gelling and Cole. By reviewing and analysing the tentative statements, hints, and underlying assumptions made in *PNL* and *LPN* (§2.2), a working definition will be developed to begin to address the four research questions (§1.3). Six main themes emerge to be explored more fully in subsequent sections (§2.2.1–§2.2.6). Having reached a provisional definition of the 'Gelling-Cole Hypothesis' (§2.3), the use of that term to name the phenomenon is briefly considered (§2.4–§2.4.2).

The current chapter and the two following were researched and prepared simultaneously. Since defining the GCH early in the thesis was a higher priority, several of the approaches adopted here will occasionally anticipate conclusions arising from the literature review (Chapter 3: *Research Context*) and in constructing the test datasets (Chapter 4: *Methodology and Berwickshire Corpora*).

2.1 Questions of Definition

> It is not my purpose here to analyse the results of the investigation. A large amount of the material is offered in the book, and I should prefer readers to draw their own conclusions about what is new or valuable in it.
>
> (*PNL*, 7–8)

Although apparently open-ended, this invitation from Gelling tends to frame any discourse about the discoveries she (and later, she and Cole) publicized in quite a particular way. Essentially, patterns of systematic naming are introduced and copiously illustrated but left largely without further discussion. The ramifications of such a significant discovery remain implicit and unexplored apart from occasional glimpses of a wider rationale. To accept the invitation puts an onus on the researcher to define what the system actually is; how it was operated and by whom and when; why it functioned as it did; how it arose and became established; what the effects of encountering speakers of languages other than Old English might have been; and many related questions. In focussing upon its own objectives, the present study can only touch upon a fraction of the queries elicited by this important nexus of place-naming insights. This is intentional and necessary. More definitive answers would require a depth of investigation beyond the scope of a single thesis. Yet, it is hoped this initial review may perhaps offer a starting point for future research of the GCH.

2.1.1 General Observations

Firstly, the GCH applies to topographical settlement-names:

> The 'topographical' settlement-name is the type which describes the physical setting of a place without mentioning buildings, in obvious contrast to the 'habitative' type which incorporates a word for a settlement.
>
> (Gelling 1978, 118)

Expanding this definition, Gelling introduces *LPN* by noting that *PNL* was:

> […] the first study to be made of the type of settlement-name which has been labelled 'topographical'. These names, which define settlements by describing their physical surroundings, contrast with the other main type, labelled 'habitative', which has as the main component (the 'generic') a word for a farm, manor-house, village or town. The two categories overlap. ... [But,] there is a clear distinction between the two ways of defining a settlement: in the topographical names the main emphasis is on the geographical features which were felt to be of particular significance, rather than on buildings which had been constructed there. [my ellipsis]
>
> (*LPN*, xii)

Cullen (2013, 177) comments on an ambiguity regarding 'where the boundary between the two broad, long-established classes known as "topographical names" and "habitative names" should be drawn', but as can been seen the above quotations, Gelling's own definition has been consistent from the outset. The next chapter will attempt to clarify aspects of Cullen's 'ambiguity' in the course of reviewing a previous investigation of the hypothesis, which concentrates upon non-settlement-related hill-names in southern Scotland (Drummond 2007b – §3.1.2.2). That process will lead eventually to a new methodological step that codifies and makes explicit the relationship between a settlement and the topographical feature from which it is named (§4.2.3).

A second observation is that topographical settlements occupy sites that have been renamed – both farm and feature were renamed as a semantic unit (§4.2.3). Gelling refutes the scenario of this being a sequence of two separate events, challenging the contemporary assumptions of Ekwall (*DEPN*, xiii–xviii), Cameron (1996, 25), and others, who consider the topographical feature was named before its associated settlement.[22] She argues that ascription of primacy to the landscape reflects two false assumptions: firstly, that England before the English was something of a toponymic blank slate – 'the "clean sweep" theory of post-Roman history' (*LPN*, xvii). And secondly, that:

> [...] the Anglo-Saxons gave names like Farringdon and Stottesdon to hills, those like Pusey and Charney to dry patches in marshland, or those like Harpenden and Gaddesden to valleys, and later transferred these names to settlements. […] It

[22] Gelling quotes from the introduction to *A Dictionary of English Place-Names* (Mills 1991, xxii) to illustrate this misunderstanding (*LPN*, xvii).

> seems much more likely that there were settlements at many of these sites, and that the Anglo-Saxons were naming both site and settlement. I have used the term 'quasi-habitative' for many landscape terms which occur in names of places where geography dictates that that is where people would choose to live. [my ellipsis]
>
> (*LPN*, xvii)

A third general observation is that *in practice* the GCH is ambiguous over which language(s) are involved, despite repeated claims of it being an Old English invention (*PNL*, 7, 33, 124; *LPN*, xiii–xvii, xix). For example:

> The system of topographical naming which we claim to have decoded is in the Old English language which developed in this country among the Germanic immigrants who came in the centuries following the end of Roman rule in Britain. Most of the newcomers came in the 5th and 6th centuries. They adopted a few Celtic terms, such as *crūc* [*sic*] and *penn*, from the descendants of the Romano-Britons, and at a later date, in the late 9th and the 10th centuries, some Old Norse terms were integrated into the vocabulary. But the majority of English place-names, of every category, are Old English.
>
> (*LPN*, xvi)

Investigating this admixture of languages and the proposed chronology will be central to answering whether the Gelling-Cole Hypothesis is a uniquely Old English phenomenon (§1.3.3) and in particular: does the GCH actually represent an original system that deployed Old English elements to rename places during the migration period and for an unknown interval thereafter, but which became less consistent and nuanced with the passage of time, as Gelling (1998, 76) suggests? And also, are Old Norse names coined in Britain, which seem to conform to GCH principles, a parallel development in a closely related Germanic language, or, does this reflect the workings of an Old English linguistic substratum in the Danelaw? Similarly, do names of Celtic origin fall outwith the operation of GCH, or could they embody a native version of the phenomenon that could have developed independently of Old English?

A final observation concerns the general attrition and replacement of place-names over time; a factor with the potential to undermine any hypothesis predicated upon the assumed stability of a practice across 1,500 years or more. Gelling anticipates the charge (*LPN*, xx) but presses on undaunted. However, Hall (2012, 103–4), in particular, is critical of Gelling and the assumption of British scholars more generally that early medieval English place-names were stable to the same extent as those observable in the post-Conquest period. He argues cogently from a statistical analysis of early place-name survival that *instability* is more likely to have been the norm during the crucial era Gelling (1998, 76) believes saw 'the full glory of the topographical vocabulary'. A significant finding by Hall (2012, 110–112) is that there exists a direct correlation between the size and prestige of a settlement and the likely preservation of its name. Although this insight has direct implications for the GCH, it will not be pursued further here. The debate over the chronological sequencing of place-name elements is far from concluded, but Hall's approach offers the prospect of a different paradigm, which although at odds Gelling and Cole's favoured aetiology for systematic place-naming in England may ultimately help to explain another unanswered question: the role of Old Norse (§2.2.5).

2.1.2 Consistency and Variation

> It would be a very dogged theorist who claimed always to be able to distinguish a **halh** from a **cumb**, or a **dell** from a **slæd** There may have been regional and chronological fashions for some words, though no clear dialect distinctions have been noted in this study.
>
> (*PNL*, 85)

Gelling asserts that the generic elements in topographical settlement-names cannot be synonyms (*PNL*, 7; *LPN*, xiii). This invites a query as to what might be the taxonomic principles that differentiate into categories the objects denoted by specific terms. A naming system presupposes some kind of classification, and so it becomes important to plot where along a spectrum of attributes the boundaries of class-membership lie, since in the natural world no two topographical features in the same class will be absolutely identical.

Essentially, in the case of relief-features, how much variation in the shape of a hill is permissible before a one hill-term becomes less applicable than another?

Regional variation in the distribution of generics is acknowledged as a dimension of the naming system. Gelling cites dialectal factors as a possible cause (*PNL*, 7), but more frequently the uneven geographical distribution of landform types is proposed as the reason particular elements are absent from or used differently in some areas (*PNL*, 6–7; *LPN*, 164, 182). Nevertheless, Gelling and Cole do not generally differentiate or further sub-divide generic elements on such a basis, opting instead to merely acknowledge the existence of variation, as in the following discussion of $_{\text{OE}}$ *hōh*:

> This is, however, a land-form which does not occur in all regions, and where it is absent, as in East Anglia, *hōh* is used loosely of any spur. Also, the term is used occasionally of very low ridges which do not have diagnostic shapes, and this occurs even in areas where the classic *hōh* shape is found together with the precise use of the word.
>
> (*LPN*, 186)

We might be left wondering, as was Nurminen in her testing of the GCH in Northumberland and County Durham (*HPND*, 264 – §3.1.3.2) whether generic element consistency of application vs. site variation can both be accommodated within the phenomenon. *HPND* (pp. 66–271) devotes two-thirds of its entire investigation to establishing whether the hills and hill-spurs denoted by each element are homogenous and to what degree. Nurminen concedes that class membership is not a simple matter to quantify. Her final conclusion is worth quoting in full:

> The notions of specialised use and consistency were found to be problematic, and an alternative approach to specialisation was suggested: it was argued that topographical terms typically have a continuum of meanings ranging from very general to the potentially highly specialised, and that the main difference between specialised and non-specialised terms does not lie in whether these terms are always, that is, with a high degree of consistency, used with the same meaning, but whether they display a full spectrum of meanings ranging all the way to the highly specialised, and whether the **specialised meanings are also the most frequent**

> **ones**. Based on this approach, it was concluded that the Gelling hypothesis is valid in the study area. [my emphasis]
>
> (*HPND*, 316)

The spectrum of site variability decreases, it appears, as a correlate of increased sample size. If this conclusion is correct, a clearer definition of class-boundaries should emerge as the number of tested sites is increased and the class parameter averages tend to become diagnostic of specific profiles. In terms of statistical hypothesis testing, provided toponyms grouped by their generic element are compared using a statistically significant number of examples per group, it ought to be possible, using Nurminen's insight, to differentiate groups by measured attributes alone even if a minority of hills are atypical. Whilst insisting on the actuality of a naming system, Gelling accepts variation and inconsistency, both between and within generics:

> Among the OE terms discussed, there is probably none which does not have at least a degree of specialization, though there are substantial areas of overlap. It is evident that the configuration of the hill was a more important factor in the choice of a word than absolute or comparative height. Some broad distinctions of shape are noted between various items, such as **dūn**, **hyll**, **hōh**, and **bæc**. […]
>
> (*PNL*, 124)

This lends support to *HPND*'s conclusion. The present study accepts Nurminen's explanation at face value and will approach the issues of ambiguity and inconsistency by allowing the data to speak for itself as regards homogeneity of shape within hill-terms and heterogeneity between hill-terms.

On a final note, it will be observed in Chapters 5 and 6 that some sites in the corpora cannot be measured using the current system of automated measurement. The process of filtering out unquantifiable examples (§5.5.1; §5.5.1.1) will inevitably enforce a partial degree of homogeneity across the entire corpus. This is held not to invalidate the findings since potentially all elements are impacted to the same degree.

2.2 A Thematic Review of *PNL* and *LPN*

The structure of *PNL* (replicated by *LPN*), divided into seven themed chapters, emerged in the course of studying a very large corpus of topographical settlement-names (*PNL*, 5). Chapter 5 ('Hills, Slopes and Ridges' in both publications) with some 1,541 toponyms is by far the classification with the highest number of cited examples (25% of *LPN*).[23] These are taken as representative of how raised landscape features are conceived within the proposed system and, although toponyms and elements from other chapters may be referenced in passing, investigation of three of the research questions (§1.3.1; §1.3.2; §1.3.4) will generally draw upon evidence from this single toponymic class. By contrast, the remainder of the present chapter will include all seven classes in considering broader questions concerning the Gelling-Cole Hypothesis and whether its proposed chronology, linguistic origins, aetiology, and so forth, make it a uniquely Old English phenomenon (§1.3.3).

2.2.1 Geography, Ubiquity, and Sources

PNL and *LPN* give fleeting illustrative examples from Scotland and Wales (*PNL*, 17, 22, 39–40, 99, 210; *LPN*, 18, 123, 145, 163, 224, 249, 285–286), and indeed *PNL*'s subtitle, 'The Geographical Roots of Britain's Place-Names', appears to promise more than the sporadic inclusion of Scottish and Welsh material. This is reinforced by the *Abbreviations* section of each work, which lists a three-letter code for every historic shire and county in England, Wales, and Scotland (Gelling 1978, 9–10; *PNL*, vii–viii; *LPN*, ix–x). Yet, such apparent inclusivity seems to be aimed at advocating an adoption of the system by fellow researchers rather than illustrating the geographical range of the GCH (*PNL*, 9). Dating from 1970 (Nicolaisen 1976, xxvii), these abbreviations, of which Margaret Gelling was a co-inventor, were bewailed by one reviewer critical of the replacement of Ekwall's 'well-established

[23] See Table 2.1 for a tally of examples and elements by toponymic class.

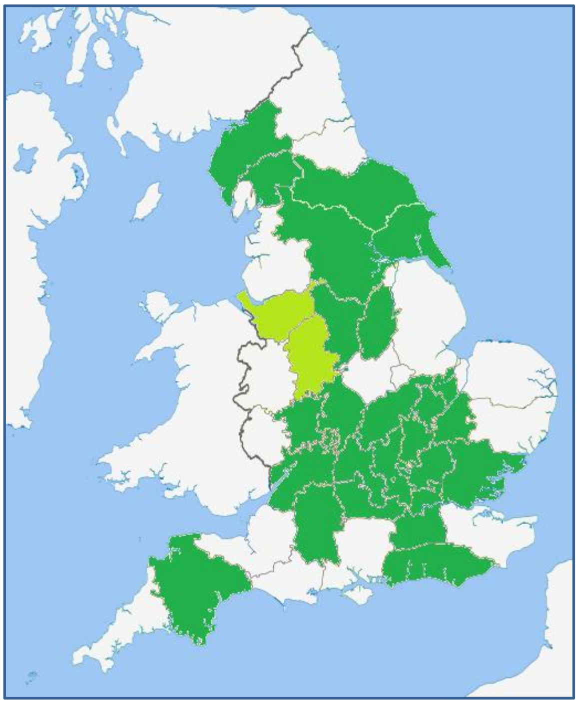
county abbreviations' (Watts 1985, 103). Presumably, referencing names within and furth of England by a Britain-wide standard was deemed superfluous. In Scotland, this system has since become standardized through its adoption by SSPN (Taylor 2016, 78), and hence its use here. Nonetheless, despite showcasing abbreviations pertaining to Scotland, Wales, and the Isle of Man, in practice, *LPN* deals with places almost exclusively (99.3%) of English provenance.[24]

And yet even across England, the coverage is not even. Gelling and Cole (1998, 76–77) acknowledge there are areas, such as Devon and Cornwall (*LPN*, xv), and north-west Derbyshire (*LPN*, 37; Cullen 2013, 176–177), where the usual 'precision and subtlety of English topographical names' (Gelling 1998, 75) appears to wane. In the case of south-west England, Gelling attributes this to the colonization of the region by Old English speakers post-dating the 'full glory of the topographical vocabulary' which 'belongs to the earliest centuries of English speech' (Gelling 1998, 76). Doubt over the validity of this paradigm has already been signalled (§2.1.1), and some implications of its proposed chronology will be considered presently.

LPN enlists in excess of 6,062 place-names examples to establish an evidence-base and to demonstrate the ubiquity of the GCH. This figure is reached by tallying the number of entries in the *Index*, excluding very common place-names (e.g. Ashton, Farndon, Milford, Oakley, etc. – labelled 'var.cos') that recur in single counties or across several. Thus, the above total tallies 303 common names only once (Fig. 2.2 and Table 2.3) whereas the actual total is liable to be somewhat higher. In arriving at this number, place-names ascribed to Greater London 'GTL' or the Isle of Wight 'IOW' have been restored to their historical counties (ESX, HRT, KNT, MDX, SUR, and HMP), and habitative- and river names discounted.

[24] The actual tallies are: Wales (26), Scotland (10), and the Isle of Man (7).

Reliance on secondary sources is inevitable when researching topographical elements on such a vast scale. The most important of these were the full- and partially-complete SEPN county surveys available prior to the publication of *PNL* and *LPN*. Additional county material gathered before and since the founding of EPNS was also mined, and *English Place-Name Elements* (*EPNE*) furnished many useful examples and up-to-date definitions for specific target elements. Corroboration and insights wherever relevant were included from historical and archaeological sources. Gelling (1988, 68–9; *PNL*, 4–5) states that the fourth edition of *The Concise Oxford Dictionary of English Place-Names* (*DEPN*) is the main corpus upon which the GCH is based.



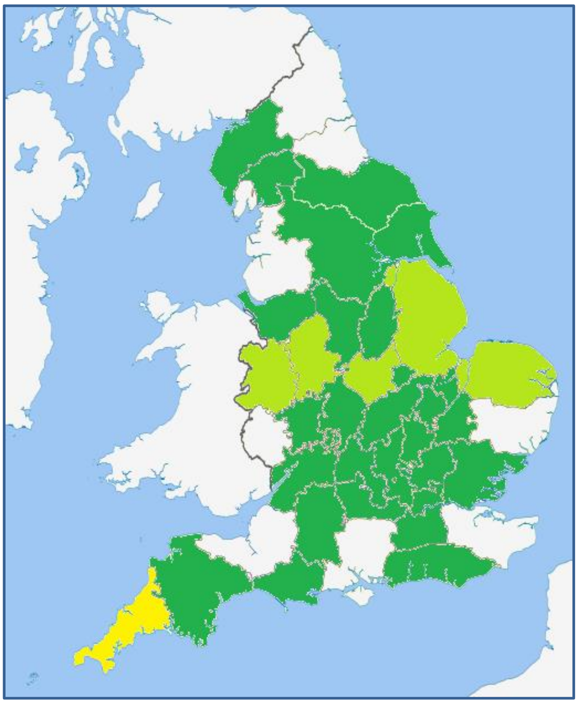


Fig. 2.1. SEPN vols. published by 1984 (*PNL*).   SEPN vols. published by 2000 (*LPN*).[25]

Complete Survey   Partial Survey   Place-name Elements Survey

Fig. 2.1 shows the SEPN volumes available prior to the publication of *PNL* and *LPN*. This distribution of names can be compared with Fig. 2.2, which gives the total number of toponyms per county cited as evidence for the GCH. Fig. 2.1 reveals that SEPN volumes

[25] Map adapted from Greg 2012, <https://commons.wikimedia.org/wiki/File:English_counties_1851.svg>.

were not available for many areas against which to compare *DEPN* and other sources. In testing the GCH in northern England, *HPND* faced the same challenge of having only one survey volume for part of County Durham and none at all for Northumberland (§3.1.3).

Whilst acknowledging its limitations, Gelling states that *DEPN* provides 19,000 'largely sound' etymologies covering most major and some minor place-names across all of England (*PNL*, 4). Referring to its compilation, Ekwall freely admits the omission of some names 'because of the insignificance of the places, or because the names are self-explanatory, or because no early forms were available', but includes others that were 'etymologically interesting', or known from early records (*DEPN*, ix). Gelling notes that most of the parish and estate names appearing in the Domesday Book (*DEPN*'s primary historical source) are included (*PNL*, 4), but with full awareness that much of northern England and certain major towns are not treated there. Nonetheless, she does give a qualified assurance that *DEPN* provides a 'representative collection of the ancient settlement-names of the country', despite its less than 'rigorously logical criteria' of inclusion (*PNL*, 4). This characteristic may be significant when examining how the GCH applies to England as a whole; the probability being that areas for which settlement-names were not recorded before 1500 are likely to be under-represented. However, whilst noting this possibility exists, no attempt will be made here to quantify any bias – geographical or otherwise – in the corpus underlying *PNL* and *LPN* derived largely from *DEPN*.

2.2.2 Language

Turning to a consideration of the languages encompassed by the GCH, *Appendix O* (Vol. II) tabulates all the place-name elements and their main variants discussed in *PNL* and *LPN*, indicating the linguistic origin of each. This exercise reveals that *PNL* and *LPN* examine 195 and 163 toponymic elements respectively, grouped into seven classes. There is a net reduction of 32 in the tally of elements between the earlier work and its sequel. In *LPN*, 42 elements have been demoted to passing references, largely omitted from the *Index*, and ten new elements have been added or their status has been increased to full discussion sections.[26]

No explanation is given for these differences, however it is immediately apparent that the chapter, 'Woods and Clearings' (*PNL*: 'Trees, Forests, Woods and Clearings'), is where the metaphorical axe has been busiest, suffering a net loss of 11% despite the introduction of four new interrelated terms for a woodland clearing.

Toponymic Class	**Place-names**	**%**	**Elements**
'Rivers, Springs, Pools and Lakes'	913	15	25
'Marsh, Moor and Flood-Plain'	541	9	18
'River-Crossings and Landing-places, Roads and Tracks'	764	12	19
'Valleys and Remote Places'	905	14	21
'Hills, Slopes and Ridges'[27]	1,541	25	47
'Trees, Forests, Woods and Clearings'	1,090	17	21
'Ploughland and Pasture'	548	9	12
Total:	**6,302**	**100**	**163**

Table 2.1. *LPN* corpus: tally of place-names and elements by toponymic class.

The 6,302 examples referring to 6,060 places (Table 2.1) show that 242 place-names appear in two or more chapters of *LPN*, e.g. Woodbridge SFK; Streatley BRK. Such

[26] The demoted elements are: OE ***āc*** 'oak-tree'; OE *æppel* 'apple-tree'; OE *æsc* 'ash-tree'; OE *æspe* 'aspen-tree'; OE *alor* 'alder-tree'; OE *apuldor* 'apple-tree'; OE ***bēce*** 'beech-tree'; OE *beorc*, *birce* 'birch-tree'; ON *birki* 'birch-tree'; OE ***bōc*** 'beech-tree'; OE *box* 'box-tree'; OE *byxe* 'box-tree,?box wood'; OE *cwabba* 'marsh'; OE ***ēg**-land* 'island'; ON *eik* 'oak-tree'; OE *ellern* 'elder-tree'; OE *elm* 'elm-tree'; ON *elri* 'alder-tree'; ON *fjall, fell* 'mountain'; OE ***flōde*** 'channel of water'; ON *gata* 'road, street'; OE *hæsel* 'hazel-tree'; ON *hesli* 'hazel-tree'; OE *īw* 'yew-tree'; OE *lane, lone, lanu* 'lane, ?slow-moving river'; OE *lind* 'lime-tree'; OE *mapul, mapuldor* 'maple-tree'; OE *pirige* 'pear-tree'; OE *plæsc* 'shallow piece of standing water'; OE *salh, sealh* 'sallow willow'; ON *sík* 'small stream'; OE *soc* 'marsh'; OE *thorn, thyrne* 'thorn-tree'; OE ***trēow*** 'tree, post, beam'; ON *vatn* 'lake'; OE *wæter-scipe* '?conduit, ?reservoir'; OE *wagen* 'quaking bog'; OE *welig* 'willow-tree'; OE *wemm* 'filth, marshy place'; OE *wice* 'wych-elm'; OE *wilig* 'willow-tree'; OE ***wīthig*** 'willow-tree'. The new or promoted elements are: ON *haugr* 'tumulus, hill'; OE **hwæl* 'hill'; OE ***pēac*** 'peak'; OE ***pīc*** 'point, pointed hill, prickle'; OE **ric* 'strip'; OE **roth* 'clearing'; OE *****rȳd, *rīed, *rēod, *ryde, *rede*** 'clearing'; OE **ryden, reden* 'clearing'; OE **ryding* 'clearing'; OE **werpels* '?access track in common fields'.
[27] The number of examples in *LPN* (pp. 324–391) was calculated by compiling and editing an Excel spreadsheet populated with data gathered using OCR software (§6.1.2). *HPND* (p. 267, Table 4.39) reckons the number of *LPN* examples to be 1,577.

place-names, having multiple topographic elements, feature in more than one toponymic class. More precise statistics could only be achieved through examining the etymologies of all 242 in turn, which the current objective of giving a broad impression of the volume and relative weighting of each toponymic class does not justify. The 247 place-names that appear in the 'Appendix: the Chilterns, a Case Study' (*LPN*, 288–316) were manually assigned to their relevant toponymic classes.

Table 2.2 shows the percentage and number of elements of *Appendix O*, grouped by toponymic class and language of origin. This demonstrates that three quarters of the elements illustrating the GCH are found in settlement-names presumed to have been coined in an Old English-speaking milieu. Old English (70%) and Celtic loan-words (6%) account for the linguistic origins of 76% of *PNL*'s examples, and 75% (68% + 7%, respectively) of those in *LPN*. The balance in each case is Old Norse. *HPND* (pp. 266–267) concludes the GCH is based on 29 Old English hill-terms, regarding **cōc/*cōce*, and **cocc* as separate elements, in line with *VEPN* (**cōc*^{2}*/*cōce* 'hillock' vs. **cocc*^{1} 'heap', s.vv.). *EPNE* does not list **cōc/*cōce*. This study follows *PNL* and *LPN* in treating **cōc/*cōce* and **cocc* as a single hill-term, whatever its actual etymology, and whilst *HPND* (Table 4.39) omits $_{\text{OE}}$ *crūc*, *crȳc* 'hill, mound, tumulus' from its tally, $_{\text{OE}}$ *crūc*, *crȳc* will be differentiated here from $_{\text{PrW/PrCumb}}$ *crū̆g* 'hill, mound, tumulus' in counting the hill-terms for each language.

Regarding raised landscape features, we conclude therefore the GCH is based on 47 hill-terms for which 1,541 toponyms are cited as illustrative of its operation.

***PNL* corpus: number and percentage of elements**

Toponymic Class	OE	ON	Celtic	Total	OE	ON	Celtic	Total
'Rivers, Springs, Pools and Lakes'	21	8		**29**	11%	4%		**15%**
'Marsh, Moor and Flood-Plain'	16	7		**23**	8%	4%		**12%**
'River-Crossings and Landing-places, Roads and Tracks'	13	6	1	**20**	7%	3%	1%	**10%**
'Valleys and Remote Places'	14	5	2	**21**	7%	3%	1%	**11%**
'Hills, Slopes and Ridges'	26	10	8	**44**	13%	5%	4%	**23%**
'Trees, Forests, Woods and Clearings'	37	9	1	**47**	19%	5%	1%	**24%**
'Ploughland and Pasture'	9	2		**11**	5%	1%		**6%**
Total number of elements:	**136**	**47**	**12**	**195**	**70%**	**24%**	**6%**	**100%**

***LPN* corpus: number and percentage of elements**

Toponymic Class	OE	ON	Celtic	Total	OE	ON	Celtic	Total
'Rivers and Springs, Pools and Lakes'	19	6		**25**	12%	4%		**15%**
'Marsh, Moor and Floodplain'	11	7		**18**	7%	4%		**11%**
'Roads and Tracks: River-Crossings and Landing Places'	13	5	1	**19**	8%	3%	1%	**12%**
'Valleys, Hollows and Remote Places'	14	5	2	**21**	9%	3%	1%	**13%**
'Hills, Slopes and Ridges'	29	10	8	**47**	18%	6%	5%	**29%**
'Woods and Clearings'	15	5	1	**21**	9%	3%	1%	**13%**
'Ploughland, Meadow and Pasture'	10	2		**12**	6%	1%		**7%**
Total number of elements:	**111**	**40**	**12**	**163**	**68%**	**25%**	**7%**	**100%**

Table 2.2. *PNL* and *LPN* toponymic classes compared by languages of origin.

2.2.3 Chronology and Causality

The formation and floruit of the GCH are unambiguously stated:

> There will have been expansion of settlement and formation of new names throughout the Anglo-Saxon period, but it is my belief that many of the names discussed in this book date from the 5th century, and that they record perceptions of the landscape and of the situations of ancient settlements in that landscape which are those of the earliest Anglo-Saxon immigrants.
>
> (*LPN*, xix)

Section 2.2.2 concluded that 68% of the English place-names surveyed in *LPN* were coined in Old English and additional 7% employed a Celtic loan element. The last are mostly hill-terms and have the appearance of partial or wholesale adoption from existing Romano-British place-names, rather than having been lexicalized.[28] Gelling (1978, 53–62, 87–105) offers a detailed survey of surviving Celtic place-names and their assimilation into the Old English named landscape. Two fully lexicalized Celtic topographic elements are *cumb* 'short, broad valley', and *torr* 'rock, rocky outcrop / peak', although *LPN* classifies the first as Old English since it could derive from a parallel $_{\mathrm{OE}}$ *cumb*, 'cup, vessel' (*LPN*, 106–107. *cf.* Fig. 3.1, Boon Hill LEG) . The second is not considered either by *PNL* or *LPN* despite its occurrence in settlement-names (*EPNE*, 184).

And yet, the quotation above seems to run counter to aspects of the accepted historical development of Old English. It also appears to contradict other statements in *LPN* about the *when* and *how* of the GCH. Although '*Adventus Saxonum*' is an outdated concept (Lapidge *et al.* 2014, 6) it will be used here to characterise the supposed suddenness of the arrival of Germanic-speaking peoples in Britain during late antiquity. The idea of some kind of

[28] The Celtic elements are: *barr* / *barrǫg* 'top, hilly'; *blain* / *blaen* 'point, end, top'; *breʒ* / *brigā* 'hill'; *brig* 'top'; *brinn*, *bryn* 'hill'; *cę̄d* / *coid* / *coed* 'wood, forest'; *crūg* 'hill, mound, tumulus'; *glennos* 'valley'; *mönith* / *mynydd* / *meneth* 'mountain, hill'; *nant* / *nans* / *nant* 'valley'; *penn* / *pen* 'head, end, headland, chief, coastal promontory'; and *ritu-* 'ford'. Coates (2007, 48–49) adds further elements to this list and suggests their overwhelming use as simplex names and as specific elements in two-element Old English place-names demonstrates they were semantically opaque when borrowed. He cites the six rivers called Avon as a classic example of this process, but see also Padel (2013, 26–27). Hough (2010, 3) observes that certain place-name elements rarely function as specifics; the fact that the Celtic elements listed would normally only function as generics in their original languages reinforces Coates's argument.

founding event seems to find an echo in the Gelling's statement that the GCH arose spontaneously (§2.2.6) and began to rename Romano-British settlements apparently without a period of maturation. Objections to Gelling and Cole's paradigm will be explored in the following two sections.

2.2.4 The so-called *Adventus Saxonum*

Elsewhere in the *Introduction*, Gelling states her belief that the GCH operated 'from Kent to Northumberland and from the east coast to Offa's Dyke' (*LPN*, xv). Such an area far exceeds the generally accepted bounds for the diffusion of early Anglo-Saxon material culture – and by implication the primary formulation of Old English place-names – before the close of the sixth century, i.e. the *terminus ad quem* she posits (*LPN*, xvi, xix).

Nielsen (1998, 70–71) provides a useful synthesis of linguistic and archaeological evidence, charting the early geographic spread of Old English speakers across England up to this period and beyond. He reproduces Jackson's celebrated map dividing southern Britain into four zones, 'Areas I–IV', according to the density of surviving Brittonic river-names (*LHEB*, 220). Gelling (1978, 89–90) also reproduces Jackson's map and comments on its continuing general usefulness as a framework for the discussion of Brittonic names. More recently Padel has remarked:

> [Jackson's] map is based on [Ekwall 1928], and it has been often cited and reprinted; since the corpus has changed little since Ekwall's time, the map remains valid today, and agrees rather well with more recent maps showing Brittonic settlement-names.
> (Padel 2013, 8)

Jackson proposed that the increasing rates of Celtic linguistic preservation, east to west and south to north, correlate with datable phonological developments during the fifth to eleventh centuries (*LHEB*, 198–219) and can therefore give an approximate dating to the spread of Old English speech. Nielsen contrasts Jackson's zones with the distribution of Anglo-Saxon archaeological sites known to be in existence by 450, 475, and 520–560. He observes that Jackson's Areas I and II (i.e. eastern England, c. 600 in the south; c. 650 in the north) show the lowest survival of Brittonic river names in broadly the same areas for which Hines (1990, 34–36) demonstrates the presence of Anglo-Saxon archaeological remains by the mid-sixth century. This inverse correlation is taken to provide broad support for the validity of Jackson's Old English frontier (Areas I and II), assumed here to be the likely greatest extent of Old English speech c. 600.

LPN indexes most of its place-name examples by county. This facilitates their general quantification relative to the assumed diffusion of Old English by c. 600. Fig. 2.2 juxtaposes the traditional English counties with the c. 600 linguistic frontier based on Jackson's other map, 'The Anglo-Saxon Occupation of England' (*LHEB*, 208–209), which gives a clearer representation for northern Britain as well as a more definitive boundary at that date. It is immediately apparent from Fig. 2.2 that areas west and north of the c. 600 Old English frontier provide more than sporadic evidence for the GCH, in contrast to the situation reflected by the 0.71% of *LPN* place-names cited from Wales, Scotland, and Isle of Man. Table 2.3 is a summary of the data underlying Fig. 2.2. Together these demonstrate the incidence of *LPN* place-names by county (or partial county for those bisected by the c. 600 boundary) relative to Jackson's Areas I and II (presumed to be Old English speaking to some degree) in contrast with Areas III and IV (presumed to be Celtic speaking).

Gelling's statement regarding the fifth and sixth centuries should predict that Areas III and IV, with negligible numbers of Old English speakers c. 600, stand in sharp contrast to Areas I and II, where place-names conform most faithfully to the principles of the GCH in its earliest and most pristine manifestation. If there were indeed a decline in precision from the seventh century, its attenuation should be a generally recognisable feature in areas that began to coin Old English place-names from c. 600 onwards. But, this is not the case.

Fig. 2.2. Tally of place-names by nation and English county, referenced in *LPN*, relative to Jackson's linguistic frontier c. 600. (Celtic speech areas – green; Old English speech areas – red).[29]

[29] Map adapted from Dr. Greg 2012 [CC BY-SA 3.0] via Wikimedia Commons.

In fairness to Gelling, the full statement of her position, parts of which have been previously quoted, reads:

> I must stress that the few examples I have included in this chapter represent the rule, not the exceptions. The naming system which has been deciphered by our field-work has been found valid in most of England. It does not work so well in Devon, and this combines with other evidence to indicate that the full glory of the topographical vocabulary belongs to the earliest centuries of Old English speech. I shall not attempt to deal with the historical, linguistic and philosophical questions raised by the fact that with few exceptions this vocabulary is used in the same way from Kent and Dorset to Northumberland and Westmorland, but I hope that my illustrations will convince you that this is so.[30]
>
> (Gelling 1998, 76–77)[31]

Nevertheless, an engagement with 'historical, linguistic, and philosophical questions' is a vital step in examining the GCH. Analysis of the provenance of the place-names referred to by *LPN* reveals that 2,086 of the quoted examples (34.42% of the corpus) could not have been coined before c. 600 because Old English speech would not have penetrated so far west and north by that date. If we accept provisionally the GCH operated largely in the same way across most of England, then for it to include these western and northern areas, the time-frame for the 'full glory of the topographical vocabulary' must extend into the centuries beyond c. 600, although genuinely contemporary evidence remains unavailable for several decades after that nominal date.

Despite the claim to a higher level of consistency in the east and south, in practice Table 2.3 shows no such differential is apparent when place-names that must have been formulated after c. 600 are cited. If such a distinction were made, we would be forced to conclude the GCH has multiple tiers of applicability, with Kent in the premier league, Dorset and Northumberland perhaps in the second division, and Westmorland somewhere in the third. Naturally, there would still have been local variation, as Cullen (2013, 176–7) has posited for

[30] Investigation of spatial and diachronic consistency and the specialised reference of toponymic elements are the central questions addressed by *HPND*.
[31] Published two years before *LPN*, Gelling 1998 draws upon and presents identical material.

north-west Derbyshire – an area of assumed later settlement by Old English speakers. Of course, other factors may have been involved such as imperfect language acquisition by former Brittonic speakers perhaps over a number of generations. But notwithstanding local differences, the application of the GCH's principles, as practised by its authors, is not held to be diminished or invalidated in any way by a post-600 date of coining. This is further borne out by the tacit admission of Old Norse elements into the system at some point between the late ninth and eleventh centuries. Had the 'full glory' of the GCH really been largely confined to Old English place-names coined before c. 600, then there would be little purpose in using as evidence non-Old English place-names nor indeed any furth of Jackson's Areas I and II.

County	Total	%
BDF	97	1.60
BRK	127	2.10
BUC	154	2.54
CAM	83	1.37
DRB	114	1.88
DRH	22	0.36
ESX	164	2.71
GLO	160	2.64
HMP	192	3.17
HNT	35	0.58
HRT	115	1.90
KNT	189	3.12
LEI	56	0.92
LIN	151	2.49
MDX	55	0.91
NFK	156	2.57
NTB	125	2.06
NTP	99	1.63
NTT	81	1.34
OXF	161	2.66
RUT	16	0.26
SFK	151	2.49
SSX	199	3.28
STF	148	2.44
SUR	105	1.73
WAR	120	1.98
WLT	148	2.44

County	Total	%
WOR	129	2.13
YOE	95	1.57
YON	119	1.96
YOW	64	1.06
OE zone	**3,630**	**59.88**

County	Total	%
CHE	144	2.38
CMB	135	2.23
CNW	40	0.66
DEV	324	5.35
DOR	129	2.13
DRB	23	0.38
DRH	66	1.09
GLO	28	0.46
HRE	103	1.70
LNC	268	4.42
NTB	33	0.54
SHR	171	2.82
SOM	210	3.46
WML	85	1.40
YON	62	1.02
YOW	265	4.37
Celtic zone	**2,086**	**34.42**
var.cos.	303	5.00

Table 2.3. *LPN* place-names by English county, relative to Jackson's linguistic frontier c. 600.

Nurminen, researching hill-terms in Northumberland and County Durham (a region straddling Jackson's Areas II and III), amply demonstrates that systematic settlement-naming is observable outwith the fifth- and sixth-century areas of Anglo-Saxon colonization. Despite Gelling's claim that: '[t]here is not much left of the ancient variety and subtlety in the topographical vocabulary of modern English' (*PNL*, 7), the phenomenon has been detected to a not insignificant degree in Middle- and even Modern English formations in north-east England (*HPND*, 269–271). Gelling suggests a mechanism to account for this possibility whilst maintaining the system will inevitably have decayed with time:

> The relative frequency of simplex examples in the small corpus of major names suggests that a *cnoll* was a distinctive type of hill, but the survival of the word into modern English means that it is liable to have been applied to any small hill in names of comparatively recent origin.
>
> (*LPN*, 153)

Nevertheless, Gelling hints at a prolongation to her preferred timescale of the fifth- and sixth centuries, although it is unclear to what degree and for how long this possible extension might have operated:

> A good case can be made for the prevalence of topographical settlement-names in the earliest decades of English speech, but this does not, of course, mean that all such names are 'early'.
>
> (*LPN*, xix)

2.2.5 Old Norse

The second objection to Gelling and Cole's paradigm is linguistic and chronological, albeit having established that Old English place-names coined after the sixth century may carry equal weighting with those formulated before, the way ahead has become somewhat clearer.

Returning to Gelling's statements in respect of language, the scenario she describes might plausibly account for three quarters of the elements examined in *PNL* and *LPN*, i.e. those of Old English origin together with the handful of elements borrowed from Celtic and Romano-British Latin place-names. However, the two assertions that the 'system of topographical naming [...] developed in this country' and that 'some Old Norse terms were integrated into the vocabulary' (*LPN*, xvi) require closer scrutiny. Gelling downplays the role of Old Norse:

> Norse place-names in eastern and northern England are probably to be associated with an expansion of settlement after the Viking invasions of the late 9th and 10th centuries, but not many of these names have topographical generics.
>
> (*LPN*, xviii)

However, Table 2.2 shows that 40 (24.7%) of the 163 topographic elements considered by *LPN* are of Old Norse origin. In reality, Gelling's 'some' is an unexpectedly high proportion: almost a quarter of the total elements selected for study. The gross counting of elements, rather than a tally of place-name examples incorporating such elements will be somewhat impressionistic, but ahead of the completion of SEPN it remains impossible to offer a better approximation of the percentage and geographical spread of English place-names having an Old Norse component or origin. Furthermore, the linguistic proximity of Old Norse and Old English (§2.2.6) most probably precludes a definitive attribution of origin in a large number of individual cases.

By way of a general comparison, an analysis of the 5,955 English place-name elements, available for the 86 SEPN volumes digitized to date, produces a tally of 3,761 elements and personal names; 3,066 (81%) of which are labelled as Old English, and 695 (19%) Old Norse.[32] This reduction in the Old Norse percentage of SEPN compared with *LPN* may stem from the fact that these 3,066 elements include not only topographical settlement-names but

[32] The balance of 2,194 elements are labelled as other languages or later stages of English. These statistics were compiled from a copy of the Digital Exposure of English Place-Names (*DEEP*) database, kindly supplied by Jayne Carroll on 6 November 2017.

other place-name classes. It also seems likely that once data from the unsurveyed SEPN counties, many of which never formed part of the Danelaw, are added in coming years, the Old Norse percentage relative to that of Old English may be reduced still further. Such ratios provide only a very approximate indication of the incidence of Old Norse in English place-names. Even once SEPN is complete, such statistics will still largely reflect survival rates and other possible biases in available sources. Nevertheless, Gelling (1978, 69–72, discussing Cox 1976) adopts a similar procedure in beginning to sketch her own chronology for English place-names. Given that 24.7% of the elements cited in *LPN* are Old Norse, its contribution must be viewed as significant rather than merely incidental.

2.2.6 North-west Germanic

We might wish Gelling had been less reticent to discuss how the GCH came into being (Gelling 1988, xv), since several of the general observations she offers in passing are intriguing. Not least among these is the assumption that Scandinavian immigrants and settlers, three or more centuries after the so-called *Adventus Saxonum* (Cameron 1996, 73–74), came to adopt an Old English paradigm when coining their own place-names in Old Norse. That may have some bearing on a different but perhaps related issue: if the GCH '**developed** in this country among the Germanic immigrants who came in the centuries following the end of Roman rule in Britain' [my emphasis] (*LPN*, xvi), does that mean it had its origins in Britain? Such would appear to be the implication of the following elaboration:

> The nature of the English landscape may be of crucial relevance. It is remarkably varied, and variety often occurs within small spaces. In this it contrasts with Continental landscapes, where everything is on a much bigger scale. It is likely that immigrants accustomed to the vast coastal marshes and great plains and forests of northern Europe were impressed by this variety and found it a linguistic challenge. They would share **the same inherited vocabulary** and they may, when faced with the same visual challenges in Kent and Northumberland, have responded with **the same items in that vocabulary**. [my emphasis]
>
> (*LPN*, xv)

Fig. 2.3. Bungsberg (Schleswig Holstein).[33]

The Chilterns (near Tring HRT).[34]

Fig. 2.4. River Zwalm (East Flanders).[35]

River Nene (near Alton Waterville HNT).[36]

Fig. 2.5. Calenberger Land (Lower Saxony).[37]

The Ridgeway OXF.[38]

[33] Source: <https://commons.wikimedia.org/wiki/File:Bungsberg_14.jpg>.
[34] Source: <https://commons.wikimedia.org/wiki/File:A_Historic_View_across_the_Gap_in_the_Chiltern_Hills_-_geograph.org.uk_-_1353511.jpg>, © Chris Reynolds.
[35] Source: <https://commons.wikimedia.org/wiki/File:Bungsberg_14.jpg>.
[36] Source: <http://www.whitmore-house.co.uk/image/ferry-meadows.jpg>, © Whitmore House 2018.
[37] Source: <https://www.hannover.de/var/storage/images/media/01-data-neu/bilder/bilder-region-hannover/naherholung2/gr%C3%BCner-ring/gr-tour-8/calenberger-land/9320465-1-ger-DE/Calenberger-Land_image_full.jpg>, © Hannover.de.
[38] Source: <http://www.chevening.org/scholars/blog/2016/in-the-spotlight-oxford>, © Crown copyright 2015.

It is difficult to accept the landscape of the Chilterns would appear unfamiliar to a people from the rolling *Hügelland* of Schleswig-Holstein (Fig. 2.3.); or that the catchment areas of the Rivers Zwalm and Nene (Fig. 2.4.) would not evoke rather similar descriptors; or that the view across the Calenberger Land of Lower Saxony could not easily be mistaken for parts of Oxfordshire (Fig. 2.5.). Such parallels of 'variety [...] within small spaces' could easy be multiplied. In short, contrary to Gelling's assertion, in reality much of eastern and southern England bears a striking resemblance to many of the areas of north-western Europe thought to be ancestral to the Germanic emigrants who settled in post-Roman Britain in the fifth and sixth centuries. It seems highly improbable these peoples would have experienced the landscape of England as 'a linguistic challenge' because of its alien appearance. In introducing the chapter, 'Marsh, Moor and Flood-plain', Gelling even advances an opposing view to that she later settled upon:

> To people migrating from the northern coasts of Europe the marshes of south-eastern England cannot have appeared unfamiliar or exceptionally daunting. (*PNL*, 33)

We seem to be on less quaky ground if we consider these Germanic peoples shared 'the same inherited vocabulary' (*LPN*, xv) and probably responded to their new environment 'with the same items in that vocabulary' (*ibid.*). Most importantly, such a modified hypothesis would offer a simple solution to the twin problems of a supposed origin of the GCH in Britain and its adoption by Old Norse speakers coining names from cognate terms for the landscape of the Danelaw.

Could it not be that the phenomenon discovered by Gelling and Cole was common among speakers of north-west Germanic dialects before the various groups emigrated to Britain and merged to become the Anglo-Saxons? Thus, an *Adventus Danorum* three centuries later actually marks a reintroduction of the GCH by a linguistically related population? Such a two-wave theory would help to account for the ubiquity of the phenomenon across England, both in the Danelaw and beyond. This scenario would explain the spread of systematic topographical settlement-name formation to the west and north of Jackson's c. 600 linguistic frontier (§2.2.4) by both Old English- and later Old Norse speakers during the centuries before the Norman Conquest. An extended process taking several centuries to evolve seems more plausible than a sudden manifestation, fully-formed for the most part, as Gelling proposes.

Of the 40 Old Norse elements discussed by *LPN*, 31 have an Old English cognate, often with an identical or very similar connotation.[39] Udolph (2006, 319–336), surveying the range of place-name correspondences between England and north-western Europe, examines 143 elements of which 65 are found within the *LPN* canon. This includes 13 of the 46 hill-terms listed in *Appendix O*: *bæc; clif; cnoll, cnyll(e); copp; dūn; hēafod; hlāw, hlǣw; hlinc; hlith; hyll; næss, ness*; **rǣc, ric;* and *scelf, scelfe, sci(e)lf, scylfe*. Underpinning Udolph's research is an assumption that the proto-Anglo-Saxon immigrants possessed a fully established place-naming system, which they readily deployed after they arrived in Britain.

Responding to Udolph's earlier research (1991, 1994, 1995), both Nicolaisen (1995, 294–295) and Nielsen (1998, 69–70) have expressed reservations over some of the elements examined. They highlight the citing of common Germanic lexical items as if these automatically belong to the toponymicon, as well as his treatment of specific and generic elements in place-names as comprising evidence of equal weight. Nevertheless, Nicolaisen finds that Udolph's corpus does lend overall support to the general principle that 'the emigrants [took] with them across the Channel certain name models that could be activated whenever the circumstances provided the right triggering device'. He continues:

[39] OE/ON cognates are: *æcer/akr*; *bæc/bekkr*; *beorg/berg*; *botm/botn*; *brycg/bryggja*; *burna/brunnr*; *camb/kambr*; *celde/kelda*; *clof/clofi*; *dæl/dalr*; *ēa/á*; *ēg/ey*; *gewæd/vath*; *hēafod/hǫ́futh*; *hlith/hlíth; hrycg/hryggr*; **hwæl/hváll*; *land/land*; *mēos, mos/mosi*; *mōr/mór*; *næss/nes*; *sǣ/sǣr*; *sceaga/skógr*; *scelf/skjalf*; *sīc/sík*; *slōh/sol(h)*; *stæth/stǫth*; *stīg/stígr*; *strōd, strōther/storth*; *weald/vǫllr*; *wudu/vithr*. Nicolaisen (1995, 298), in a similar list of 36 cognates, omits 13 of the above, but offers a further 18, albeit these include habitative elements along with topographical ones: *burh/borg; clif/klif; ecg/egg; flēot/fljót; hām/heimr; hēah/haugr; hǣth, hāth/heiðr; hol/hol; holt/holt; hūs/hús; lād/laða, hlaða; rod, rodu, roð/ruð; sand/sandr; set/setr; stede/staðr; þrop/þorp; þwit/þveit; wæter/vatn*.

> What is so significant about the toponymies which complement or collide with each other in England is that they presuppose a connecting centre, on the one hand, and a common ancestry, on the other. It would be absurd to regard all these terms purely as lexical items which could be employed in the naming process whenever required; they must have been part of a Northwest Germanic onomasticon, and not just of a lexicon.
>
> (Nicolaisen 1995, 298)

Nielsen (1998, 80–83), in discussing the general sociolinguistic processes that shape the evolution of emigrant languages and dialects, reflects that it is common for the earliest stable variety of a new language to become highly influential in determining its subsequent development. The earliest archaeological evidence points to East Anglia, the East Midlands, and the area north of the Thames (Böhme 1986, 558) as the regions of England to receive the first wave of settlement from Lower Saxony (early in the fifth century) and from contiguous parts of Schleswig-Holstein (Higham 1992, 172–175). A much more substantial second wave around the mid-fifth century, apparently from the same continental homelands, settled more widely 'from Kent to Hampshire, and, north of the Thames deep into the Midlands' (Nielsen 1998, 65), i.e. the southern region of Jackson's Area I (§2.2.4). This would lend support to Gelling's belief that the earliest Old English settlement-names in England date from the fifth century and 'record perceptions of the landscape […] which are those of the earliest Anglo-Saxon immigrants' (*LPN*, xix). If the dialectal convergence of these people came to have a particularly strong impact on shaping the subsequent character of Old English place-naming, this is likely to be the vector for the spread of the north-west Germanic toponymic tradition Gelling and Cole 'deciphered'.

It would be very interesting to compare the early topographical settlement-names in south-east England and north-west Germany in greater detail to test whether a system can be shown to operate in both areas and whether parallels and differences are discernible. If it were established that proto-English peoples on the Continent shared a sociolinguistic tradition with speakers of Old Norse, then the origins of the GCH may well be considerably earlier than have hitherto been proposed.

2.3 Conclusion and Working Definition

Consideration of the proposed chronology and aetiology of the GCH has provisionally expanded its scope beyond Old English and beyond the regions inhabited by its earliest speakers. Although the traditions of the earliest immigrants may have established the trajectory of Old English place-naming traditions, as Gelling would prefer, it is difficult to agree that an England-wide system would have evolved so rapidly and consistently in the proposed time-scale. Given the close linguistic parallels between Old English and Old Norse and their ultimate common origin, it seems improbable systematic topographical settlement-naming originated in Britain during the fifth and sixth centuries. With approximately a quarter of the elements cited to demonstrate the GCH drawn directly from Old Norse, both an earlier origin – possibly on the Continent – and a later period of operation are strongly suspected. *HPND* (pp. 269–270) has found evidence for some continuation of the GCH in north-east England even into the Modern English period. The implication for place-names of Scottish provenance is now clear. Investigating and possibly finding the GCH is a factor in place-naming furth of England after c. 600 requires no special explanation. Indeed, the GCH appears to remain detectable to some degree in place-names coined in insular Germanic languages a millennium or more after its proposed introduction. Any possible connection with naming practices in Celtic languages remains to be investigated.

For current purposes, the following definition will be used:

> The GCH is a system of topographical settlement-(re)naming, practised by north-west Germanic immigrants to sub-Roman Britain and reinforced by the settlement and assimilation of Old Norse speakers before the Norman conquest of England.

2.4 Naming the Phenomenon

This chapter concludes with a brief discussion of why 'Gelling-Cole Hypothesis' has been adopted a working title for the system revealed and profusely illustrated in the pages of *PNL* and *LPN*. This centres on two questions: Is *hypothesis* actually a valid term to describe such a methodological framework? Is there justification for referring to it as the *Gelling-Cole Hypothesis*?

2.4.1 Is it valid to use the term *hypothesis* of the core methodological framework proposed by *PNL* and *LPN*?

OED2 defines *hypothesis* as:

> A supposition or conjecture put forth to account for known facts; esp. in the sciences, a provisional supposition from which to draw conclusions that shall be in accordance with known facts, and which serves as a starting-point for further investigation by which it may be proved or disproved, and the true theory arrived at.
>
> (*OED2* HYPOTHESIS[3] *n.*).

Nurminen (*HPND*, 27, fn. 2) observes that Gelling does not label her insights explicitly as a hypothesis. However, in her opening remarks, Gelling (*PNL*, 5) does position the system she has uncovered as the direct successor to the post-war academic assumptions, which Dodgson (1966), Cox (1976), and others had progressively demolished:[40]

> In the 1960s there was a reaction against the hypotheses which up until then had governed the thinking about the historical significance of place-name evidence.
>
> (*PNL*, 2)

She lists five such areas: i) pre-English names; ii) names in *-ingas* and *-ingahām*, believed to record the name of a settlement's founding 'chieftain'; iii) names that could be attributed to pagan religious practice; iv) names containing supposed 'archaic' words; and v) names of

[40] Writing of Dodgson's conclusions regarding names in *-ingas*, Gelling comments: 'his full-scale attack in 1966 blasted the accepted theory out of the water' (2003, 14).

Norse origin.[41] In their stead, Gelling proposes a 'full-length study of topographical settlement-names may help to redress an imbalance', thus offering *PNL* as a replacement hypothesis or set of hypotheses (*PNL*, 5). She does refer explicitly to one of these – the early chronological significance of topographical names – as a *hypothesis* (*PNL*, 6). In her later volume, Gelling comments that the proposed early dissemination of topographical settlement-names could be countered by the presumed disruption of general discontinuity before the eighth century:

> The unstable nature of place-names in the earliest centuries of English speech is a weapon which could be used to support contrary hypotheses.
>
> (*LPN*, xx)

– a process also remarked upon by Hall (2012, 103–104), who cites Gelling as reflecting 'conventional wisdom' on early chronology and patterns of naming. Nonetheless, Gelling's use of the term does reveal how she conceptualises 'the major discovery' (*LPN*, xv).

Justification for using *hypothesis* to describe this collections of ideas is strengthened by Gelling's conclusion to an article reflecting upon the first four decades of English place-name studies:

> The framework we set up seems at present to be more comfortable for the two generations below ours than the Stenton framework was for us in the 1960s and 1970s. But all our theories are **hypotheses** and they are open to question and revision. [my emphasis]
>
> (Gelling 2003, 15)

Given that Gelling uses this term several times – if somewhat obliquely in *PNL* and *LPN* – and that such usage concurs with the cited *OED* definition, the present study has opted to refer to and examine these and related works as if the authors had explictly framed their evidence as presenting a *hypothesis*. Furthermore, statistical hypothesis testing will be applied in Chapters 5 and 6 with the added intention of formally demonstrating a hypothesis

[41] Gelling (1978, 15) describes these categories as 'more or less inspired guesses'.

can be tested and thereby *de facto* Gelling and Cole are doing more than setting out the evidence for others to judge, as expressed in the opening quotation of this chapter (§2.1).

So, in terms of its own name, *hypothesis* will stand as the generic element; but what of the specific? Hitherto, opinion has oscillated between naming it after one author or both. As previous commentators employ a range of different forms, it seems desirable while seeking to more precisely delimit the scope and characteristics of the 'hypothesis' that any dubiety over its own name should likewise be addressed.

2.4.2 Why call this phenomenon: *The Gelling-Cole Hypothesis*?

Cullen (2013) has charted how the hypothesis emerged over time. Starting with Gelling's earliest inklings, published around 1952 (Cullen 2013, 164); through the 'revolution' in English place-name chronology of the 1960s and early 1970s, from which *Signposts to the Past* emerged in 1978; and so on to the publication of *PNL* in 1984, it might justifiably be claimed that sole authorship of the idea should be attributed to Gelling. And indeed, two of the most recent commentators have called it variously 'the Gelling hypothesis' (*HPND*, 27, 35–36); 'Gelling's hypothesis', and 'Gelling's reappraisal of the topographic corpus' (Cullen 2013, 165–166).

Gelling describes the beginning of her collaboration with Ann Cole as a 'turning point in the study' (*LPN*, xiv). Referring to Cole's earliest article on toponomastics (Cole, 1982), she comments:

> Here, the precise use made by the Anglo-Saxons of the two commonest 'valley' words, **cumb** and **denu**, is explained most convincingly. It is a relief to find that my earlier impressions about the meaning of these elements were roughly correct, though in need of refinement.
>
> (*PNL*, 85)

It appears that within a year of their first meeting in 1981 Gelling and Cole's individual expertise and ideas had begun to converge and influence one another's research. Although each contributed from separate disciplines, it is clear 'the pleasure and excitement of our shared addiction' (*LPN*, xiv) made possible a greatly increased volume of field-work, which culminated in their co-authorship of a fully revised *PNL*, published as *LPN* in 2000. Gelling writes:

> Ann is a geographer, while I am primarily a philologist: the benefits of this combination are obvious.
>
> (*LPN*, xiv)

Gelling elsewhere describes the intensity of their extensive fieldwork:

> This absorbing hobby has taken over my life and that of my geographer colleague, Ann Cole.
>
> (Gelling 1998, 76)

Many insights into the ubiquity of Old English topographical naming patterns across much of England, and the clarification of distinctions, such as the difference between $_{\mathrm{OE}}$ *fenn* 'fen' and $_{\mathrm{OE}}$ *mōr* 'marsh, barren upland', were very much joint discoveries (Cole 2009, 160). Hough (2001, 118), reviewing *LPN*, reflects that: 'their shared responsibility for many of the ideas and insights is evident throughout'.

The use of sketched illustrations prepared from photographs – a special enhancement of the process and presentation of results contributed by Cole (*LPN*, xiv) – had first appeared two years earlier in Gelling 1998. A flavour of the collaborative process as it happened is glimpsed in the following account by Ann Cole:

> I have found the slides and correspondence relating to Tysoe and Ivinghoe. Margaret's Tysoe and my Ivinghoe are among the SNSBI web site photos.[42]

[42] See Fig. 2.6. The full archive is available at <http://www.snsbi.org.uk/Gelling-Cole_photos.html>.

Margaret and I, when working separately, both took two exposures of any worthwhile view so that we could have one each when they were developed. These are the extracts from our letters regarding slides and other matters.

MG to AC dated 12th July 1988 enclosing a slide of Tysoe: "The Tysoe one I took on the way home from your house [26th June 1988]. The diagnostic characteristic of a hoh may be the upward tilt at the point".

AC to MG in reply dated 16th July 1988 enclosing a slide of Ivinghoe taken on 9th July "... but I chuckled when I read your comment on Tysoe as I was going to make just the same comment to you about Ivinghoe".

We had each been doing field work at much the same time and come to the same conclusion regarding the nature of a hoh at about the same time.[43]

Fig. 2.6. Tysoe WAR (photograph: M. Gelling).

Ivinghoe BUC (photograph: A. Cole).[44]

LPN was revised for reprint in 2003 by both authors, and following Gelling's death in 2009, minor amendments were made in the new 2014 edition by Cole alone. Some commentators on *PNL* and *LPN* have ascribed the hypothesis to both authors, calling it: 'Gelling and Cole's study' (Pratt 2005, 93); 'the Gelling and Cole Hypothesis' (Drummond 2007b, 85); 'the Gelling–Cole idea', 'the Gelling and Cole model' (Kitson 2008, 389, 393); and 'the Gelling and Cole approach' (Waugh 2008, 414; Hough 2010, 8).

It seems a fitting testament to their joint endeavours and an academic friendship spanning 28 years that the current study should do likewise, and moreover, propose that in future the

[43] Personal communication from Ann Cole, 27 March 2017.
[44] Photographs reproduced with kind permission of Ann Cole, and from the estate of Margaret Gelling.

core methodological framework be referred to by a standardized term: *The Gelling-Cole Hypothesis*.

RESEARCH CONTEXT

Chapter 3

3.0 Summary

This chapter reviews six studies that investigate the three core themes of this research: the Gelling-Cole Hypothesis as a verifiable theoretical framework; the extension of Gelling and Cole's methodology to Scotland; and Berwickshire place-names. In Chapter 4, the main Scottish corpora to be analysed in subsequent chapters will be collated from data extracted in the process of preparing these reviews.

3.1 Studies Testing the Gelling-Cole Hypothesis

Given its significance to English toponomastics, the thoroughness and inspiration of Gelling and Cole's work, although lauded and widely accepted, has inspired surprisingly few attempts to replicate its methodology. Several researchers anticipate the extension of the GCH's scope into Scotland (Taylor 1998, 4–5; Hough 2001, 119; *HPND*, 317; *LPN*, 224), but the present study is the first to conduct such an examination in depth. The journal articles 'Summer Landscapes: Investigating Scottish Topographical Names' (Pratt 2005 – §3.1.1) and 'Southern Scottish Hill Generics: Testing the Gelling and Cole Hypothesis' (Drummond 2007b – §3.1.2) are initial small-scale attempts to apply the GCH to place-names north of the English border; each will be reviewed in some detail to set out the context of the current investigation and to highlight a variety of issues that confront researchers attempting to evaluate the GCH's validity in southern Scotland.

'Hill-terms in the Place-Names of Northumberland and County Durham' (*HPND*) achieves the first and hitherto only major re-evaluation of Gelling and Cole's principles. In 2012, Nurminen observed that Pratt 2005 and Drummond 2007b were the only previous studies to have the GCH as a particular focus or which seek to test it (*HPND*, 34). Kitson (2008; 2012) raises a lone dissenting voice over the interpretation of particular topographical elements but without suggesting an alternative hypothesis to account for the general phenomenon of systematic naming. Both Murray (2006) and Tempan (2004; 2009) take inspiration from the GCH in their respective surveys of Gaelic hill-names in highland Perthshire and of selected elements in Ireland. Having considered in Chapter 2 the general validity of exploring non-Old English systematic place-naming, as conceived by its authors for England, there is justification now for extending an investigation of the GCH *mutatis mutandis* to other areas.

3.1.1 'Summer Landscapes: Investigating Scottish Topographical Names'

Pratt's article is the first attempt to explore the feasibility of applying Gelling and Cole's fieldwork-based methodology in a Scottish context. Given the laborious nature of site-visits, and constrained by just eight weeks' funded research, the author understandably warns against expectations of 'grandly comprehensive or conclusive findings' (p. 93).

The project investigated nine Old English generic elements[45] believed to manifest in 34 central and southern Scottish place-names (p. 94); an additional example from England, *Shotton* DRH, was included with the apology: 'Although technically outside the Scottish border, we included this investigation as we were nearby' (p. 109). This caveat is perhaps symptomatic of a more pervasive issue that faced all researchers in 2005: the considerable challenge of assembling trustworthy Scottish etymologies exclusively from secondary sources. Although *Place-Names of West Lothian* (*PWLO*) might have been mined for

[45] *clif*, *dūn*, *denu*, *hēafod*, *hōh*, 'ness' (see below), *ofer*/*ufer*, *scelf*, and **scēot*.

examples with the target elements, there were very few other reliable resources available to Pratt. The best contemporary but necessarily general academic study *The Names of Towns and Cities in Britain* (*NTCB*) is mined for the only Scottish example of $_{\text{OE}}$ **scēot* (Shotts LAN – p. 110).[46] Scott (2004, 339–340) rejects *NTCB*'s etymology in favour of an ultimate derivation from $_{\text{OE}}$ *scēat* 'corner, nook, division of land'.[47] 'The Non-Celtic Place-Names of the Scottish Border Counties' (*NPSB*), another reliable source that would have proven useful, was all but inaccessible to researchers outwith the University of Edinburgh at that time (§3.2.2). Thus, some of the conclusions reached by Pratt in 2005 unfortunately demonstrate the risk of attempting to evaluate the GCH without the solid foundation of SSPN county volumes, the first of which (*PNFIF1*) did not appear until the following year.[48]

Pratt derives her four examples of 'ness' from $_{\text{ON}}$ *nes*; none is etymologized from $_{\text{OE}}$ *næss*, *nēs* or $_{\text{OE}}$ *nesu*, despite the article's explicit intention to examine Old English elements (p. 94). Indeed, Gelling and Cole caution 'there is a possibility of a significant difference in usage' for names in $_{\text{ON}}$ *nes* and $_{\text{OE}}$ *næss* (*LPN*, 197). *HPND* (p. 34) in its review surprisingly refers to Pratt's 'ness' as $_{\text{OE}}$ *næss* in reckoning that eight Old English elements comprise the study's scope, whereas the tally is actually eight Old English plus one Old Norse. Taken together, Pratt's tacit substitution of $_{\text{ON}}$ *nes* and *HPND*'s assumption that $_{\text{OE}}$ *næss* is the element under investigation prompted the queries regarding a definition of the GCH in the previous chapter. This centred in particular on whether researchers themselves have been clear the phenomenon of systematic naming applies to toponyms coined exclusively in an Old English context, or, if its purview is linguistically broader, has the GCH arisen independently in other languages? Was it transmitted between them, and when and under what circumstances might such cultural transference have occurred? Could linguistic and

[46] This element is discussed in *PNFIF5* (s.v.). §4.1.1.9 quotes Drummond's etymology of Shotts from *PNLAN1* (forthcoming).
[47] This doctoral thesis was submitted in 2004 but did not become publicly available for several years.
[48] Although SSPN was officially founded in 2016 (§1.4.1) county volumes modelled on and including *PNFIF1–5* are counted retrospectively within the Survey (*PNKNR*, ix).

dialectal variation haved played a role in some instances (§2.1). Although significant, such questions cannot be investigated in any greater depth at present.

Consequent upon the timeframe of Pratt 2005, there was little opportunity to obtain a comprehensive range of historic forms to confirm whether the Old English elements under consideration actually connote the same senses as do their later Scots reflexes. In practice, supportive evidence was gleaned where available from national and United Kingdom-wide place-name digests, many of which omit to cite early forms (Pratt 2005, 94). The corpus was compiled by selecting place-names from OS maps that 'seemed to contain generics referred to by Gelling and Cole', combined with examining and comparing alternative etymologies. Although examples with a pre-twelfth-century origin were supposedly singled out for investigation (pp. 94–95) in fact only five (15%) of the 34 names considered satisfy this criterion.[49] Evidence from historical forms was not available for 56% of the corpus. Furthermore, there are no references to local pronunciations that could have supported the identification of syllables containing the target elements (e.g. Gleniffer Braes RNF ?< *ofer*, *ufer* – §4.1.1.7). *HPND* summarizes the conclusions of Pratt 2005 but does not investigate if they are justified:

> Pratt's observations were in line with those made by Gelling and Cole in the case of *clif*, *dūn*, *hēafod*, *næss* 'promontory, headland' and *scelf* 'rock, ledge, shelving terrain', but 'the evidence [was] less secure' for *hōh*, **ofer*, *ufer* 'slope, hill, ridge' and **scēot* 'steep slope' (p. 98).
>
> (*HPND*, 34)

Unfortunately, the main weakness of the article is its method of selecting which place-names are suitable to examine. Clearly for 'testing' to be valid, there must be a high degree of certainty each toponym actually contains the target element. *HPND* (pp. 39–40) recognises and addresses this issue but does not apply that insight to its review of Pratt 2005.

[49] Hassendean ROX, Hownam ROX, Lillesleaf ROX, Southerness KCB (< *Salterness*), and Tullibody CLA. There are 11 other names for which pre-nineteenth-century forms are cited: Bo'ness WLO, Denholm ROX, Denny STL, Duns BWK, Gordon BWK, Hadden ROX, Howpasley ROX, Loanhead MLO, Shotts LAN, Skelfhill ROX, and Wormerlaw BWK.

The present study will trial an expanded version of *HPND*'s general approach by conducting a re-evaluation of Pratt's conclusions (§4.1.1). Each of the 34 place-names will be reviewed in the context of developing a tool to determine which Berwickshire place-names actually contain hill-terms. The process described and applied there will be referred to as 'toponymic triage'. This system refines the methodology of *HPND* by introducing a staged method of evaluation and produces a tabulated representation of how toponyms proposed to test the GCH are justified or rejected, whilst documenting the reasoning behind each decision.

3.1.1.1 Conclusion

Pratt 2005 is successful in beginning to apply Gelling and Cole's methodology to Scotland. However, the study inadvertently highlights that any method, by which place-names are selected to test the phenomenon, must ensure they do categorically contain the elements under investigation. Unfortunately, only 15 of the 34 examples in Pratt 2005 are admissible (see Table 4.2). Critically, for 'testing' to be possible, the article also demonstrates by omission the importance of establishing a clear definition of the GCH (§2.3).

3.1.2 'Southern Scottish Hill Generics: Testing the Gelling and Cole Hypothesis'

Drummond (2007b, 85) seeks to examine whether Scots hill-generics represent a system of differentiated relief-features across southern Scotland analogous to Gelling and Cole's conclusions about topographical settlement-names in much of England. To that end, the article adopts a very different tack from Pratt 2005. Taking a lead from Matley 1990 regarding the incidence of various topographical elements, Drummond divides Scotland south of the Forth-Clyde isthmus into three linguistic zones.[50] These are distinguished by the surviving Gaelic and Scots hill-names recorded during the past four centuries; earlier evidence is rare (p. 86). Within the two Scots zones, the elements *law* (< $_{\text{OE}}$ *hlāw*) and *fell* (< $_{\text{ON}}$ *fjall, fell*) have a distribution of 'almost complete mutual exclusivity' (p. 93), clustering either side of the Dumfriesshire/Tweed watershed, with *law* concentrated to the north-east and *fell* to the south-west.[51] Gaelic hill-terms are largely confined to the west of the *fell* zone, south and west of the River Nith (pp. 93–96). Some support for Drummond's observation comes from *NPSB* (p. 103): 'There is not a single example of G *beinn* prefixing a hill-name east of the Nith, and only a few isolated cases in the westernmost parishes of D[MF]'.

Having demonstrated this remarkable *law* versus *fell* distribution does not stem from geological or geomorphological differences, the article proceeds to tabulate the physical attributes of a representative 20 hills across the region and to compare their characteristics of acclivity, summit shape, and the presence of cliffs.[52] The main criterion for inclusion in the corpus is to have >150 m 'drop to col' on all sides (2007b, 96–97). Drummond remarks:

> I have to conclude there are no apparent topographical distinctions between these two, and their distribution reflects linguistic or dialect patterns, name-givers choosing from their 'local' generic.
>
> (p. 97)

And yet, it is questionable whether the GCH, as presented by its authors, is tested by examining generic elements for the same hill-type in different languages (e.g. $_{\text{OE}}$ *beorg* vs. $_{\text{ON}}$ *berg*), rather than different elements in the same language (e.g. $_{\text{OE}}$ *beorg* vs. $_{\text{OE}}$ *hlāw* – both a 'rounded hill, tumulus'). Nevertheless, in evaluating the article's 'testing' of the GCH

[50] Matley considers the complementary distribution of ten elements (*cairn, craig/crag, cleuch, dod, fell, hope, knowe, law, pike*, and *rig*) in southern Scotland and northern England. Despite citing *PNL*, the article's focus and conclusions are primarily geographic rather than toponymic and will not be examined further here.
[51] A rare eastern example of *fell* comes from deep within the Drummond's law-zone: *Glengelt Felles* 1654 *Blaeu (Pont) Lothian*. It is the only source to record this name. The area, now Carfrae Common CHK, is centred at NT 47998 58007. It is possible the word is being used lexically rather than as a true place-name.
[52] The actual parameters are: altitude above sea-level; independent altitude of the summit above the contiguous landscape (termed 'drop to col'); number (0–4) of steep sides; the presence of cliffs (location or absence); and summit shape (broad, large, wide, or narrow plateau; asymmetric; rounded; flattened cone; conical; or narrow ridge).

in southern Scotland, it will be useful to pursue such questions further, as well as to explore the explicit and implicit issues these raise, especially around chronology. Such considerations, as noted in Chapter 2, are no less germane to clarifying and defining the scope of the current investigation.

3.1.2.1 Scottish Gaelic in South-Eastern Scotland

Across southern Scotland over the past two millennia, no fewer than six languages have contributed pieces to the toponymic mosaic.[53] The poorly documented fate of one of these will serve to illustrate the general issues involved in attempting to reconstruct the linguistic past from Scottish place-names, and from generic elements in particular.

The contribution of Scottish Gaelic to the toponomastics of south-eastern Scotland is elusive and obscure. Drummond (2007b, 89) directs attention to the absence of Gaelic hill-names from the extensive swathe of high ground between the River Nith and the North Sea, which of course includes Berwickshire. The article contends this area 'bears […] virtually no trace of Gaelic and might fairly be considered as a monolingual zone of Scots generics' (*ibid.*). Yet, arguing from an absence of surviving evidence is precarious – the fact there are *any* Gaelic names in say Berwickshire should give us pause.[54] Drummond offers no elaboration as to how this observation might relate to testing the GCH nor does he suggest what such paucity might indicate. However, enquiring whether this conclusion plausibly reflects the linguistic history is fundamental to any appraisal of the interaction between the documented and undocumented languages of the region. Have Gaelic hill-names been replaced, or were

[53] Brittonic, Gaelic, Old English, Old Norse, Scots, and Scottish Standard English. Traces of Old French are also found, and some of the more obscure names, especially hydronyms, may have pre-Indo-European roots.
[54] *REELS* examples include: Bogangreen CHM, Bunkle BUP, Drummaw MRD, and Longformacus LMS. Ross MRD and Duns DNS might augment this small set, although the first could plausibly derive from $_{\text{Br}}$ *rōs,* and the last $_{\text{Br}}$ *dīnas*, or more likely to reflect $_{\text{OE}}$ **dūnas* (pl.) the twin features, Duns Law and Little Duns Law.

they never coined east of the River Nith? The author's opinion appears to be there are 'non-Gaelic parts of southern Scotland' (p. 99), as elsewhere he affirms:

> Gaelic is by far the most important language in hill-words: virtually every hill in the Highlands has a Gaelic name, and many in the Lowlands too; only **the south-eastern Borders are untouched by it**. [my emphasis]
>
> (Drummond 2007a, 10–11)[55]

Although the literature also tends to the view that Gaelic influence on place-name formation decreases the more south-easterly the county (e.g. Nicolaisen 1976, 123–136), any certitude ahead of the publication of all the relevant SSPN volumes rests upon a less than sure footing.[56] And again, Drummond 2007a, referring specifically to $_{\mathrm{Sc}}$ *law*, maintains:

> This is surely the archetypal Scots hill-word, its answer to Gaelic's *beinn*. This fine word is found in some small measure in the western hills (in the Renfrew Heights and Campsie Fells) but it is mainly a word of **the east and south where Gaelic was not an alternative** [my emphasis].
>
> (p. 42)

To illustrate the Scottish preponderance of this element, the article (p. 89) claims: 'there are only forty-five *law* hills on the 1:50,000 maps in England', thereby juxtaposing the incidence of $_{\mathrm{Sc}}$ *law* with that of $_{\mathrm{OE}}$ *hlāw*, from which it ultimately derives. *The Database of British and Irish Hills* (*DoBIH*) is in broad agreement, listing of total of 327 examples of hills over 100 m in *-law* or *Law*, of which 42 are found in England. However, this straw poll omits the later modern English reflexes of $_{\mathrm{OE}}$ *hlāw* (*-a, -lah*, *-lay*, *-leas*, *-lee(s)*, *-ley*, *-loe*, *-low*, and *-ly* – *HPND*, 92). In Northumberland and County Durham alone, *HPND*'s very detailed examination (p. 56), also based on OS 1:50,000 scale maps, identifies 251 examples (204 'certain' and 47 'uncertain') instances of $_{\mathrm{OE}}$ *hlāw*.

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[55] The accompanying map gives a graphic illustration of how the author envisages the national distribution of Gaelic vs. Scots hill names, along with those derived from [Old] Norse, and Cumbric (i.e. Brittonic).

[56] Robb (1996, 169) offers the perspective that the prevalence of Gaelic place-names in Lowland Scotland has been over-stated through the selectivity of influential scholars and commentators in pursuit of 'an explicitly Gaelic national "origin myth"'. Despite his misclassification of Johnston 1934 as a 'scholarly' work, ranked alongside 'Watson 1926' (*CPNS*) and Nicolaisen 1976, the author presents a novel methodology, which would be of interest if extended to more recent publications reflective of the considerable advances in Scottish toponomastics and related disciplines during the past two decades.

Drummond (2007b, 86) also highlights the particular prevalence of Gaelic names among the highest summits of south-west Scotland, west of the River Nith. Following MacQueen (1973, 17–34), he assumes Gaelic disappeared from this area before the sixteenth century, and conjectures, not unreasonably, that some contemporary Scots names may have replaced earlier Gaelic ones. However, more recent research tends to differ:

> Gaelic was certainly spoken in part of the south-west in the second half of the sixteenth century, […] but it was almost certainly extinct as a native language in these areas by the late 1600s.
>
> (Withers 1984, 38)

Nicolaisen (1970, 15) agrees with this dating, citing Lorimer (1953, 42). Withers' opinion squares with reports of last native speakers from Carrick (c. 1760) and Kirkcudbright (1797).[57] In the south-west therefore, the sources for hill-names do not post-date the waning of Gaelic but overlap with that process by four or more generations. This distinction is significant. Are we not witnessing here the action of 'subtractive bilingualism' (Lambert 1977, 19) upon the *survival* rather than the *incidence* of Celtic place-names, the progress of which is slowed but not arrested in areas where Celtic speech communities overlap chronologically with the earliest historical records? In essence, are Gaelic place-names recorded in the south-west, but almost absent from the south-east, because the twilight of Gaelic in the former was longer and lasted into the era when place-names began to be preserved more frequently through being documented? The political developments of the eleventh and early twelfth centuries, whereby 'Lothian' (Peeblesshire, Selkirkshire, Roxburghshire, Berwickshire, East Lothian, and parts of eastern Midlothian) experienced a reorientation towards Gaelic-speaking 'Scotia' to the north and west, created the conditions for a limited spread of the language into the south and east and with it the coining of Gaelic

[57] D. Murray Lyon (1876) claimed Margaret Murray (Cultezron AYR) who died c. 1760 'at an advanced age' was the last speaker of Carrick Gaelic. His letter is quoted online <https://en.wikipedia.org/wiki/Margaret_McMurray>. Alexander Murray (1775–1813), linguist, minister, and latterly Professor of Oriental Languages (University of Edinburgh) allegedly spoke Kirkcudbrightshire Gaelic, having learnt it from his father, Robert Murray (1706–1797), a shepherd at Dunkitterick KCB NX 50214 71730 (Bayne and Haigh 2004, accessed October 2020).

place-names (Withers 1984, 16–19). REELS shows that even in Berwickshire a small number of these have survived (as detailed in fn. 54).

The reverse of the above situation (language shift without an overlapping literate phase) recalls Gelling's observation that the disappearance *en masse* of the majority of Romano-British place-names 'remains one of the deepest mysteries of the early history of England' (Gelling 1978 (1997 *Introduction*, 15th unnumbered page.)).[58] Did the early encounter between Germanic speakers and Celtic place-names have a similar outcome in Scotland? Speculating on OE *cruc*, *cryc* as a borrowed term, Gelling remarks:

> In some instances Anglo-Saxons were probably taking over the name by which they heard Welsh people call such eminences, but it is likely also that they adopted the word, since it occurs so frequently in place-names in England. Perhaps it filled a perceived gap in the Old English range of hill-terms.
>
> (*LPN*, 159)

Hough (2012, 17–18) suggests that to an immigrating language group, such as the Anglo-Saxons for whom place-names had to be transparent and intelligible, opaque names coined in other languages were largely redundant unless at least partially understood. Against this, the fact Old English has preserved many river- and some hill-names without apparent comprehension of their (now uncertain or unknown) meanings does raise questions about the processes involved in their adoption. However, in general, the phenomenon of the GCH does seem to bear out the premise that the place-names used and transmitted by Old English speakers needed to be meaningful.

It is interesting to contrast those areas of Scotland that saw the widespread displacement of Celtic names by Germanic ones with the picture of assimilation and to a remarkable degree the wholesale preservation of many place-names coined in Old Norse or Pictish, where the successor language was Gaelic:

[58] Against the view that place-name instability in early medieval Britain was remarkable rather than the norm, see Hall 2012.

> It will be found that modern Gaelic pronunciation as handed down by unbroken tradition is in the main intensely conservative, whether the names so transmitted are Pictish, Scandinavian, or purely Gaelic in origin. With the aid of these modern Gaelic forms, either alone or supplemented by old written forms, the investigator, given knowledge and experience, should in most cases be able to arrive at a high degree of accuracy in interpretation.
>
> (Watson 1904a, v–vi)

Watson offers no explanation as to why this should be the case, but the numerically high phonemic index of Gaelic may be a significant factor in enabling its speakers to accurately reproduce place-names coined in other languages, whereas non-Gaels, having far fewer phonemes at their command, are disadvantaged when attempting to articulate place-names heard from the lips of Gaels. Alternatively, it might be argued that Old English speakers regarded place-names coined in other languages as having lower status and were therefore perhaps less likely to attempt to reproduce their sounds. Yet, Gelling strongly rejects a projection into the past of a tendency of some modern English speakers to reform 'foreign' names, such as her example of the Welsh *Trawsfynnyd* as *Trousers*[59]:

> It is an absurd anachronism to impute the poor linguistic skills of the modern Englishman to his Dark-Age forebears, and the whole corpus of English place-names makes sense in a way which would be impossible if the names had arisen in such a manner.
>
> (Gelling 1978 (1997, *Introduction*, 9th unnumbered page))

As Watson asserts, Old Gaelic speakers did not reject Pictish and Old Norse place-names, as might be expected had perceptions of relative status been a significant contributor to the processes of adoption or rejection between those languages.

An additional factor in the survival of Gaelic place-names is that potentially habitable areas are quite severely constrained by Scotland's rugged topography. This is true to a far greater extent than is the case for southern and eastern England where Gelling (1998, 76–77) suggests the GCH may most consistently apply. We can be confident that prime Scottish

[59] Interestingly, it appears, given the vowel in the first syllable of this example, the English substitution was coined from spoken Welsh rather than written.

agricultural sites – those most often bearing the oldest attested names in an area – would originally have had Brittonic or (later) even Gaelic names, which have perished in the succession of language shifts.

The documentation of many southern Scottish hill-names begins between the mid-seventeenth and mid-eighteenth centuries. Drummond elsewhere provides several reasons for caution when using hill-name data. His research into the historical mapping of the period reveals a remarkable frequency of hill-name variation and displacement. He shows convincingly that relief-features can have multiple names under particular circumstances, and that hills and hill-spurs viewed from several directions can attract different associations and descriptive names (2007c, 33; 2009, 16–17). Despite this, he proposes that the three delineated zones, summarized above, equate to areas of separate linguistic identity and thereby commemorate successive or contemporaneous ethnic groups of Gaelic, Old English, and Scandinavian origin. Against this, a simpler explanation may be that Gaelic hill-names are just as likely to have been replaced almost entirely over time east of the River Nith; no researcher has argued that the low density of surviving Brittonic topographical settlement-names is indicative that language was not once ubiquitous and predominant across the entire region.[60]

In fairness to Drummond, the example of Gaelic in southern Scotland illustrates a real issue. Based to a large extent on the historical resources at their disposal, the conclusions reached by toponymists may be skewed by what has chanced to survive and by the processes of preservation and transmission. The role of the surveyor choice, in the addition or subtraction of epexegetic elements (i.e. secondary, explanatory generics. See Drummond 2007b, 92–93; Drummond 2007c, 31; §4.2.4), and even complete renaming as a consequence of

[60] Excluding Ross MRD and Duns DNS (see fn. 54), the four surviving Brittonic hill-terms in Berwickshire account for just one toponym apiece: **blajn* (Blanerne BUP); **bre* (Carfrae CHK); **brïnn* (Printonan ECC); and **brun* (Trabrown LAU).

cartographic patronage (Drummond 2009, 12), are very real factors. That multiple names can apply simultaneously to the same hill is frequently shown by *OSNB* entries. These preserve contemporary, locally attested options from which the map-makers were able to *select*, thereby authorising and perpetuating one name or spelling over rivals (Drummond 2009, 9). Thus, the isoglosses delineating Drummond's three zones (Gaelic names vs. names in *fell* vs. names in *law)*, may in reality reflect patterns of selective preservation and preference as much as separate language zones.[61]

Furthermore, as the review of Pratt 2005 has demonstrated (§3.1.1–§3.1.1.1), the identification of generic elements in place-names is beset with pitfalls, arising often from the unavailability of reliable early forms. Drummond (2007b, 86) rightly warns against comparing English sources with Scottish: England is far better supplied with older orthographic representations of place-names that are contemporary, or very nearly so, with the speech communities that coined them. *HPND*'s corpus of Northumberland and County Durham hill-terms (§3.1.3) illustrates that the same problem also exists for north-eastern England; almost two-thirds of the place-names analysed were first recorded after 1800 (*HPND*, 62).[62]

Sustained periods of multi-lingualism among at least a section of the predominantly non-literate medieval Scottish population would have provided the most likely context for lexical borrowing. It might never be possible to determine precisely when and where such linguistic encounters manifested in southern Scotland nor the degree to which each donor language supplied concepts or distinctions previously unremarked or differently conceptualized in the recipient. Nonetheless, it is certain over time that $_{\text{OE}}$ *hlāw* gave rise to

[61] Two mid-sixteenth-century Berwickshire witnesses testifying with regard to Hirsel CSM maintain that $_{\text{Sc}}$ *hill* and $_{\text{Sc}}$ *law* mean the same thing (*RSS* xiv no. 18, 1566). The inference must be that *law* in some place-names is almost certainly being used lexically rather than as an element firmly engrained in the toponymicon.
[62] The period of the earliest attestation of names and percentage of its corpus ('*Appendix A*') is as follows: <1100, 1.1%; 1100–1500, 12.93%; 1500–1800, 21.15%; >1800, 64.8%. A chronological breakdown by element is given by Nurminen in Table 3.6 (*HPND*, 64).

$_{\mathrm{Sc}}$ *law*, Old Norse contributed *fell*, and $_{\mathrm{G}}$ *creag* (usually realized as $_{\mathrm{Sc}}$ *craig* – Taylor 2012, 342) would complete a trio of examples from the languages under consideration. Beyond this, we cannot yet establish a general rationale for the distribution of these terms in place-names nor demonstrate more precisely when in the development of Scots such regional distinctions may have occurred. Williamson's opinion is useful in this regard:

> These two words [$_{\mathrm{G}}$ *creag*; $_{\mathrm{G}}$ *càrn* > $_{\mathrm{ModSc}}$ *cairn*] must very early have become part of the Southern Scottish dialect for in most instances they appear coupled with English elements.
>
> (*NPSB*, 103).[63]

> Danish [*sic*] terms must have been accepted into the Southern Scots dialect at an early date. [… I]t is obvious that such elements as *fjall*, *slakki*, *gil*, *grein*, and *mýrr* had been received into local dialect speech before being employed in compounds.
>
> (*NPSB*, xx–xxi).

Drummond's further articles on hill-names (2007c; 2009) demonstrate he is fully aware of these issues.

An additional consideration when seeking to test the GCH in southern Scotland is that place-names are often transmitted via languages that may have collapsed the degree of technical precision proposed by Gelling and Cole for the earliest recorded Old English names (*LPN*, 192). Consequent upon the not infrequent dearth of early forms, we cannot discern to what degree a Scottish place-name survives more or less as conceived in its language of coining, or whether it represents a reconfiguration, part translation, or assimilation into a perhaps less sophisticated toponymicon. Frequently, there is even doubt as to which language is the original (e.g. Brittonic or Gaelic), or when a name may have been coined (e.g. Old English or Early Scots). Furthermore, the 'continuum of meanings ranging from very general to the potentially highly specialised', posited for Northumberland and Durham place-names (*HPND*, 316 – §3.1.3), shows that the nuanced categorization,

[63] *Cra(i)g* is documented from the mid-twelfth (*DOST*) or late thirteenth century (*CSD2*). As a hill-term, *carn*(*e*) / *cairn* first appears in the early eighteenth century (*DSL* CAIRN[3] *n.*[1]) but occurs from the mid-fourteenth with the same sense as $_{\mathrm{G}}$ *càrn* 'a pile of stones', from which it derives (*DOST*).

proposed by the GCH may manifest across a range of an area's place-names in ways that are not apparent at the level of individual toponyms.

3.1.2.2 Topography Alone?

> One trap which the investigator of landscape terminology must not fall into is to expect to answer topographical questions solely at the level of physical surface geography.
>
> (Cullen 2013, 178)

Drummond 2007b builds an argument on an area of apparent ambiguity. The charge of unfairness is anticipated:

> It might be objected that comparing Gelling and Cole's toponyms that underlie settlements in England, with non-habitative hill oronyms in Scotland is inequitable, but [...] they entered no such codicil themselves.
>
> (Drummond 2007b, 85, fn. 2)

As outlined, the article investigates the use of *law* and *fell* in hill-naming rather than examining the names of settlements containing such terms. Although interesting as an exercise, this is not a reasonable test of the GCH as presented by its authors and understood by other commentators. The seven toponymic classes (*Appendix O*, Vol. II) to which the GCH refers *do* relate to topography, yet the objective and emphasis in researching such names is not the co-appellative feature (§4.2.3) as such but the human implications of such naming. Three broad themes emerge from Gelling and Cole's investigation of topographical elements: the siting of settlements (*LPN*, xvii), exploitation of the environment surrounding settlements (Cole 1982), and travel between settlements (Cole 1994; 2011). Other reviewers have underscored this point:

> This book [*PNL*] is about the meaning and significance of topographical settlement names, the type of village name which defines a settlement by reference to its place in the landscape.
>
> (Watts 1985, 103)

> Gelling and Cole's concern is not primarily with topographical features as such but with towns and villages named after them.
>
> (Kitson 2012, 45)

In defining what constitutes a hill-term in the context of the GCH, Gelling is unambiguous:

> A great many of the names discussed here do not strictly refer to hills. Some indeed, like Holderness YOW and Ower DOR, refer to very low ground. But in all instances the name refers to the position of the **settlement** or area in relation to something lower […]. Perhaps the extensive nature of this category of topographical place-name elements indicates that a low hill is the commonest of all types of **settlement**-site. [my emphasis and ellipsis]
>
> (*PNL*, 125)

Gelling and Cole do not use the term *hypothesis* to refer to the GCH (§2.4.1). Had they done so, we might have expected tighter definitions in order to avoid ambiguity and to permit its validity to be evaluated. In this regard, we recall Pratt's criticism (2005, 96) of the somewhat elastic definition of OE *dūn* (*LPN*, 165–7), applied not just to settlements on 'low hills in open country', but to 'settlements adjoining a large [uninhabited] hill'. Pratt observes such elasticity 'would seem to provide an explanation that fits every circumstance' and so undermine the integrity of the hypothesis. *HPND* demonstrates how crucial it is to define elements precisely so that valid deductions about their possible usage can be made (§3.1.3.1). Determining whether the GCH is applicable to topographical features in isolation is part of a similar process of clarification.

A major theme of Gelling 1978, which directly anticipates many aspects of the GCH explored more fully in *PNL* and *LPN*, is the debunking of early false assumptions regarding the chronology and historical value of particular place-name elements (§1.2.2). Gelling garners fresh insights from archaeological investigation, where available, to corroborate her own conclusions. Gelling 1978 (1997, 256–258) gives a useful review of significant archaeological studies involving place-names during the 1980s. Clearly, the examination of relief-feature names in isolation, divorced their associated settlements, is bound to lack a similar possibility of corroboration. On this basis, Drummond 2007b has omitted an important dimension by investigating oronyms only. A further objection to the 'testing' of the article is that the two hill-terms examined differ markedly in both usage and relative chronology.

Law occurs in the names of both settlements and relief-features:

> OE *hlāw*, "rounded hill", ModSc *law*, is particularly common in the Border area where the hills are almost uniformly green and round. In most cases, those names for which early spellings are obtainable, are farm-names to which the hill-names have been transferred.[64]
>
> (*NPSB*, 49).

Drummond 2007b actually refers to Williamson's 53 examples of *law* (*NPSB*, 49–54) drawn from Berwickshire and three other Border counties. Six are purely hill-names, and 'eight have the name applying to both a settlement and an adjacent (as opposed to an underlying) hill' (Drummond 2007b, 90, fn. 14). His quotation of Williamson demonstrates an awareness that investigating pure oronyms, without reference to settlements, could be less than comprehensive in scope. Chronologically, *law* is productive in formations over a far longer timespan than *fell*. Some *laws* have become significant centres, e.g. Greenlaw GRE, the erstwhile County Town of Berwickshire. Gelling (1978, 125–126) highlights that for many parts of England the main central settlement on the best agricultural land often bears a topographical name. She tentatively concludes these sites have been occupied the longest and thus often belong to the oldest stratum of settlement-names in a district.

Fell never forms part topographical settlement-names. The single exception appears to be Whin Fell CMB, which Whaley (*LDPN*, 397) suggests is 'a settlement named from a hill'.[65] The early forms in *-eld(e)* raise some doubt whether the element *fell* has been correctly identified in this case, as does Whin Fell's apparent uniqueness as a topographical

[64] Gelling refutes this last conjecture (§2.1.1).
[65] Historical forms cited are: *Wynfell* c.1170; *Whinnefelde* 1230; *Quinfel* 1268; and of the hill itself: *Whinfell Halle* 1602; *The Fell* 1658; *Whinfield Fell* 1774 (*LDPN*, 366).

settlement-name, along with the remarkably early occurrence of a name in *fell*. An alternative etymology in ME *feld* 'field' is at least a possibility. Gelling (*PNL*, 159) also interprets Whin Fell CMB as an exceptional habitational use of *fell*, unfortunately without offering further evidence. *LPN*, the later and we may assume more developed exposition of the GCH, has no entry at all for ON *fjall, fell*, which is also the only *PNL* hill-term not represented by a full section in *LPN*. *PNL* makes the following passing reference:

> fjall, fell ON "mountain" is used in mountain-names in northern England, Scotland and IOM. These names are seldom transferred to settlements, but cf. Whinfell CMB, WML.
>
> (*PNL*, 159).

The case for *fell* as a settlement-name is not proven. If Whin Fell CMB is not the exception to the rule, *fell*, in contrast to *law*, makes a rather late appearance as an element. Nurminen (*HPND*, 58, fn. 35) found no recorded examples for Northumberland and County Durham before the seventeenth century, with '93.3 % […] apparently not recorded before the 19th century' (p. 65). Whilst a lack of early evidence is not conclusive this element was unproductive before its earliest attestation, Williamson's observations 70 years earlier on the contiguous counties north of the Border are strikingly similar:

> ON *fjall*, "fell, hill", occurs sixteen times, but there are no early spellings. It is coupled with diverse first elements. [...] All may nevertheless be simply dialect formations.
>
> (*NPSB*, 125).

HPND does not include *NPSB* in its references and so Nurminen's conclusions are assumed to have been reached independently.

3.1.2.3 Conclusion

Drummond 2007b is valuable for highlighting that something *is* remarkable about the complementary distribution of names in *law* and *fell* in southern Scotland, as first noted by Williamson (*NPSB*, 125) and demonstrated in the distribution maps of Matley (1990, 109), following an original observation by Gelling (*PNL*, 162). Drummond's suggestion (2007b, 99) that more research is necessary on the relationship between relief- and settlement-names in *law* on both sides of the border is welcome. We might add that a detailed survey of all relief-names in *fell* throughout Britain would equally constitute worthwhile research, although perhaps as much for its contribution to dialectology as to toponomastics.

The article's penultimate paragraph acknowledges Gelling and Cole's reluctance to consider names in OE *hlāw*, *hlǣw* (Drummond 2007b, 99, fn. 34). Their justification for this clearly reaffirms the premise that the GCH applies not to oronyms in isolation but to topographical names referring to human habitation:

> This impressionistic treatment of *hlāw / hlǣw* compounds has been included here instead of a thorough analysis in a reference section because only a small proportion of the material is contained in settlement-names.
>
> (*LPN*, 180)

In fact, the parenthesis in the final sentence of Drummond 2007b confirms this:

> In conclusion, although the Gelling and Cole hypothesis is valid for oronyms (*within* settlement names) in Anglo-Saxon England, it is difficult to detect such a universal standard for the hills in the non-Gaelic parts of southern Scotland. [original emphasis]
>
> (p. 99)

If a 'codicil' (Drummond 2007b, 85, fn. 2) is required, the following would suffice:

> This study is not concerned with the vast category of what are loosely designated 'field' names, or with names of **landscape features which are not referred to in settlement-names**, though such material is drawn upon in discussions of some generics [my emphasis].
>
> (*LPN*, xxiii)

Thus, the stated objective of Drummond 2007b – to test the GCH – has not been fulfilled nor could it be by concentrating on the names of relief-features in isolation. The GCH investigates the coining of settlement-names that reference topographical features.

3.1.3 'Hill-terms in the Place-names of Northumberland and County Durham'

HPND is the only previous major critical examination of the Gelling-Cole Hypothesis.[66] Nurminen's approach is innovative in several respects. Every place-name on the most recent OS 1:50,000 scale maps of the historical counties of Northumberland and County Durham is reviewed in the first instance.[67] Toponyms that potentially preserve one or more hill-terms, coined at any period in any language, are collated into *Appendix A. Corpus of Names Containing Hill-Terms* (pp. 327–813). Such inclusivity ensures no early settlement-name is omitted from consideration even if it now exists only in epexegetic or affixed formations, in modern sources, or if its original location can no longer be determined. Significantly this is the first study to extend testing of the GCH any minor name or relief-feature in the study area (*HPND*, 37). *LPN*, by contrast, presents the GCH through more than 6,062 *selected* topographical settlement-names: located on or adjacent to their co-appellative feature (§4.2.3); recorded before 1500; and referenced either by *DEPN* or the EPNS county surveys then available to the authors (Fig. 2.1). Gelling (*LPN*, xxiii) acknowledges such selectivity filters out most so-called 'field-names' and purely topographical names, as quoted in the last section.

The advantage of Nurminen's all-inclusive approach to testing the GCH is that the central principle of element-to-feature consistency (Gelling 1988, 59) can be explored in breadth. *PNL* and *LPN* examine sets of aggregated place-names chosen to illustrate common features. *HPND* (p. 64), requiring clearer definitions of those features, draws on all topographical place-names including both typical and atypical examples. This difference reflects and underscores the fact that Gelling and Cole did not set out explicitly to create a hypothesis (§2.4.1), since 'cherry-picking' supportive examples (albeit over 6,000 of them!)

[66] Articles summarising aspects of *HPND* were published the previous year (Nurminen 2011a; 2011b).
[67] Although undefined in the study, Map 1.1 (*HPND*, 29) appears to depict the boundaries of Northumberland and County Durham as they existed 1889–1965.

would have eroded scientific legitimacy. With the resources at her disposal Gelling follows this principle to the fullest possible extent:

> If place-names have specific historical messages to convey these may be written in the general mass rather than, or as well as, being concentrated in the exceptions. Even if this be not the case, the exceptions will hardly be properly understood without adequate study of the mass of material which forms their background.
>
> (Gelling 1988, 3)

HPND takes this to its logical conclusion by surveying all place-names in a defined area regardless of their earliest attested date. Potentially, this lends greater statistical weight to conclusions about distribution, incidence, and the possible range of attributes connoted by a given element. Nurminen's observation (*HPND*, 37), particularly relevant to her own study area but equally applicable to much of Scotland, is that investigation of the GCH under these circumstances can be extended to purely topographical names, 'minor' names, and 'various types of names for which early historical forms are scarce'. This contrasts somewhat with Drummond 2007b (§3.1.2.2) where the attributes of relief-features are investigated completely in isolation from co-appellative settlements.

It should be noted that in compiling corpora for Berwickshire, the present study will follow *HPND* in rejecting names where the hill sense is denoted solely by an adjective, e.g. $_{\text{OE}}$ *hæh*, *hēh* 'high'. The names of fields and streets are likewise omitted (*HPND*, 27) except where these serve as clues towards the retrieval of lost names from historical sources.

Unfortunately, statistics on the total number of place-names from which *HPND*'s *Appendix A* was compiled are not provided either at civil parish or county level. Since the starting point of the methodology is an examination of every name, it would have been relatively straightforward to record such a measure at that stage. Indeed, it would still be interesting to know the variation in density and distribution of topographical names relative to the total volume of place-names. This could now be calculated only by repeating the initial process of gathering all the place-names of the two counties from the Ordnance Survey maps and other sources. Although such an investigation will be undertaken for Berwickshire (Table 4.15), it has not been possible to compare this dimension for all three counties from the data available in *HPND*.[68]

3.1.3.1 Methodology

The methodology of *HPND* will be reviewed here in detail in order to understand how the GCH can be assessed on such a scale, and to clarify which aspects may be re-applied directly to Berwickshire, and so highlight those for which alternative solutions must be sought.

The main corpora were assembled in three phases:

i) *Appendix A* – a collection and analysis of all place-names in the 167 civil parishes of Northumberland and County Durham;

ii) a pilot study focussing on 11 contiguous southern Northumberland parishes (subsequently included in *Appendix B*);

iii) *Appendix B* – a focussed study of three discrete areas (delineated and discussed below), and referred to as:

- 'Pilot study area' (comprising 25 southern Northumberland parishes, i.e. the 11 pilot study parishes expanded to include a further 14);
- 'Study Area 1' (comprising 14 northern Northumberland parishes); and
- 'Study Area 2' (comprising 32 County Durham parishes).

Appendix A is a meticulously compiled corpus of 2,227 names of settlements, hills, and hill-spurs, as well as derived coastal, vegetation, and water-feature names. It provides

[68] Nurminen has explained the actual process adopted in some detail (personal communication, 2016). Although handwritten notes are still available for transcription, it would not be within the remit of this thesis to take up her generous offer to make these available for analysis.

historical forms and suggests etymologies as the basis for an analysis of the hill-terms ascribed. This reveals that 21 of the 29 Old English elements discussed by *LPN* are present in the two counties (18 in the focussed study areas of *Appendix B*).[69] The linguistic ratios within *Appendix A* are: English 96.7%; Celtic 0.3%; Old French / French 0.3%; and 'hybrid / uncertain' 2.7%. A further breakdown of the relative chronology of names of English origin is also given.

The ubiquitous generic *hill* ($_{\text{OE}}$ *hyll*; $_{\text{ME/ModE}}$ *hill*) was identified in 739 names (33.18%) in *Appendix A* (*HPND*, 56). Apart from testing and refining the overall methodology, a pilot study suggested that a full analysis of $_{\text{ME/ModE}}$ *hill* would produce diminishing returns:

> An exception was made in the case of ME, ModE *hill* as this element is by far the commonest hill-term in the study corpus, and the findings of the pilot study indicated that the benefits of a complete analysis of features referred to as *hills* would be limited.
>
> (*HPND*, 47–48)

Apparently, this was confirmed by the subsequent examination of a random sample of ten additional names in $_{\text{ME/ModE}}$ *hill* from 'Study Area 1' and ten from 'Study Area 2'. Unfortunately, details that would allow this conclusion to be verified are not provided. As the corresponding divisions of *Appendix B* (Table 1) have 15 place-names each, thus 30 names in total, identification of actual toponyms upon which this conclusion was based remains unclear.[70] It would have been helpful if the place-names that determined *hill* would not be investigated further had been listed separately or else flagged as such in *Appendix A*.

The pilot study also confirmed the principle that examining focus areas would be sufficient to test the GCH instead of the immense task of conducting in-depth analyses of the remaining

[69] The tally of 29 Old English hill-terms (*HPND*, 266–268, Table 4.39) differs from my own analysis of *LPN* (Table 2.2). The *LPN* elements absent from Northumberland and County Durham are: *bæc*; *crūc* / *crȳc*; _*cōc_/_*cōce_/_cocc_ (*HPND*, 267, fn. 122 follows *VEPN* in treating _*cocc_ as a separate element); _*hlenc_; *ōra*; *pēac* '_*pēac_'; _*rǣc_; and _*ric_.
[70] *Appendix B*, Table 1 (*HPND*, 819–834) has 75 names in $_{\text{ME/ ModE}}$ *hill* from the focus study areas, which corresponds to Table 4.3 (*HPND*, 80). Table 3.1 below tallies an additional 41 names in *hill* from Nurminen's focus areas (*HPND*, 45–47; 49–50); hence an overall tally of 116 names.

1,488 names. The incidence of elements in the corpus justifies this decision: 79.97% of toponyms in *Appendix A* have ≥100 occurrences, shared by just eight hill-terms (*HPND*, 56, Table 3.1). Apart from citing the earliest forms of every place-name, *Appendix A* also identifies the hill-terms in multi-element names, their position in the name relative to other elements (i.e. word-initial /-final, etc.), as well as the incidence of 'additional' elements (e.g. epexegetics). There are also very useful notes recording any issues that affected the geographical identification of the feature or its proposed etymology.

Place-name, county abbreviation, civil parish, and four-figure NGRs are given in the first column of the spreadsheet.[71] This arrangement, instead of separate columns, is something of a hurdle to researchers wishing to reassess and rearrange the data electronically. For example, parishes and NGRs cannot be sorted into sets to correspond with the shaded focus areas on Maps 2.1, 2.2a, 2.2b, 2.3a, and 2.3b, which would have better aided an understanding of the relationship of individual names to focus areas and linked these with the different stages of the methodology. But, even if toponym, county abbreviation, civil parish, and NGR are apportioned into separate spreadsheet fields, it is still difficult to identify exactly which names belong to which methodological stage. The main reason is that the actual basis for grouping names is by OS grid square (p. 48, fn. 25), even though the coloured shading of civil parishes on maps (pp. 45–47, 49–50) purports to delineate focus areas and their different treatments. This would not be an issue had there been just one phase of delineation and analysis since only a limited number of names from surrounding parishes would have been included incidentally. But in practice, each focus area was expanded to include whole additional parishes and thereby parts of yet more parishes (not shaded) as they happen to occupy the same OS grid square. Consequently, the civil parish specified in *Appendix A* is not a reliable guide to exactly how each toponym contributes to the 12 (categorical) tables of *Appendix B*.

[71] *Appendix A* and *Appendix B* were created using Microsoft Excel (*HPND*, 38) and supplied on compact disc as an appendix to the thesis. It was in this format that their layout and data were consulted for this review.

Focus Areas	Civil Parishes	ME *bank(e)* / ModE *bank*	OE *cnoll* / ME *knōl* / ModE *knoll*, dial. *knowe, know*	ME *cragge* / ModE *crag*	OE *dūn* / ME *doun* / ModE *down*	ModE *fell*	OE *hēafod* / ME *heved, haved, hede* / ModE *head*	OE *hlāw* / ME *loue* / ModE dial. *law*	OE *hōh* / ME *hough* / ModE dial. *hoe, heugh*	OE *hrycg* / ME *rigge* / ModE *ridge*, dial. *rig(g)*	OE *hyll*	ME *hill* / ModE *hill*	OE, ME *sīde* / ModE *side*	Other	TOTAL
Pilot Area (NTB)	Bolam, Heddon-on-the-Wall, Kirkheaton, Meldon, Mitford, Morpeth, Newburn, Ponteland, Stamfordham, Stannington, Whalton (+ incidental names from adjacent parishes).	4	0	0	10	4	6	16	6	7	5	45	10	23	136
Pilot Area plus (NTB)	Bothal, Bywell St Andrew, Bywell St Peter, Corbridge, Cramlington, Gosforth, Hartburn, Hebburn, Kirkharle, Kirkwhelpington, Longhorsley, Ovingham, St John Lee, Thockrington (+ incidental names from Corsenside, Earsdon, Elsdon).	6	2	10	9	12	15	19	6	10	5	14	12	31	151
Area 1 (NTB)	Branxton, Carham, Kirknewton (+ incidental names from Chatton).	0	5	6	6	1	0	11	0	4	0	19	4	19	75
Area 1 plus (NTB)	Chatton, Chillingham, Doddington, Eglingham, Ford, Ilderton, Ingram, Lowick, Norham, Whittingham, Wooler.	2	3	17	20	0	4	28	6	10	2	14	6	40	152
Area 2 (DRH)	Aycliffe, Bishop Middleham, Bishopton, Garmondsway Moor, Grindon, Kelloe, Merrington, Redmarshall, Sedgefield, Stainton-le-Street, Trimdon (+ incidental names from St Oswald Durham).	3	2	0	9	0	1	8	2	0	2	18	7	11	63
Area 2 plus (DRH)	Billingham, Bishop Auckland, Brancepeth, Castle Eden, Darlington, Durham, Easington, Elton, Elwick, Haughton-le-Skerne, Heighington, Long Newton, Monk Hesledon, Pittington, Ryton, St Andrew Auckland, St Giles Durham, St Oswald Durham, Sherburn Hospital, Whitworth, Whitwell House.	6	0	2	14	3	3	9	5	5	1	6	13	32	99
	TOTAL	**21**	**12**	**35**	**68**	**20**	**29**	**91**	**25**	**36**	**15**	**116**	**52**	**156**	**676**

Table 3.1. The incidence per focus area of *HPND, Appendix B* toponyms and hill-terms. ('plus' indicates secondary expansions of the original 'Focus Areas').

Table 3.1 was 'reverse-engineered' from *Appendix B* to clarify which civil parishes contributed place-names to the various methodological stages, as well as to accurately determine the incidence of hill-terms in each focus area. The motivation for this level of detail is explained in §3.1.3.3.

It would also have been useful had *Appendix A* flagged the place-names that contributed to the particular focus areas in *Appendix B*. Ambiguity as to which areas are being studied, and how, is increased by the occurrence of certain anomalies. Some names from *Appendix A*, one would expect to be analysed further, do not feature in *Appendix B*, e.g. Sprucely, (Bishop Middleham Parish DRH, NZ 3431) lies well inside 'Study Area 2' and is etymologized from $_{\text{OE}}$ *hlāw*.[72] Also, head-name and NGR are the only data-fields shared by the two *Appendices*. Thus, when reviewing a particular element, e.g. $_{\text{OE}}$ *dūn* and its reflexes (*Appendix B*, Table 7), the reader is obliged to consult 68 separate entries in *Appendix A* to consider all the examples of this element. It would have been useful to view place-names grouped by hill-term.

Essentially, the *Appendices* of *HPND* would provide greater utility and transparency if: i) place-name, location, focus area, historical forms, and target hill-term were separately sortable (in the computing sense – §4.2.6), and ii) either the civil parish *or* OS grid square defined the boundary of focus areas, but not one in theory and the other in practice. Overall, the research and data of the *Appendices* are excellent, but the manner of their presentation does not do justice to the care taken to compile them.

Appendix B Topographical Data (pp. 813–970) comprises 12 tables of detailed analysis of the commonest hill-terms in 568 place-names occurring in the three representative areas of

[72] Other examples are: Dyke Head, NZ 0291; and Tod Knowe, NY 9894 (both Hartburn Parish NTB, i.e. 'Pilot Study Area plus' – Table 3.1); and Belmont (Pittington Parish DRH, NZ 3043, i.e. 'Study Area 2').

the two counties.[73] Having assembled these data into a main corpus with focus areas in the first three chapters (pp. 27–65), *HPND*'s Chapter 4 assesses the topography 'denoted' (p. 313, fn. 162) by the generic elements in place-names, and Chapter 5 examines the semantic range 'connoted' for hill-terms by their collocation with specific qualifiers. Although *HPND* (p. 28) seeks to answer: 'What types of elements are the hill-terms compounded with? Are there typical collocations?', the present study does not treat this interesting dimension as central to testing the GCH and its extension to Scotland.

An important innovation of *HPND* is the development of a consistent descriptive terminology (pp. 23–26), more precise than that used by Gelling and Cole, to complement the measurements and observations amassed from map- and field-work. Whilst there is some apparent overlap and redundancy in these labels, and one instance of duplication in the same table (p. 170), the principle of using systematized descriptors is sound to the extent these can be applied consistently and reproduced with the same results by other researchers.

3.1.3.2 Testing the Hypothesis

Chapter 4 of *HPND* aims to evaluate the validity of the GCH in the hill-terms of Northumberland and County Durham. In practice, this consists in a comparison between the physical measurements and descriptors tabulated in *Appendix B* and collated statements from *PNL* and *LPN*, regarding *specialised use* and *consistency* of application of individual hill-terms. Making this comparison is not straightforward:

[73] An incidence of 635 hill-terms in 568 place-names is the tally of the tables in *Appendix B*. *HPND* gives these totals as 634 and 567 respectively (p. 66). The discrepancy arises as the one instance of OE *hēafod* (Hartside, Ingram Parish NTB, NT9716) is found in *Appendix B*, Table 5 which has 29 examples, whereas 28 examples feature in the analysis of ME *heved*, *haved*, *hede* or ModE *head* (p. 150).

> It should be noted that while both [*PNL*] and [*LPN*] argue for the richness and precision of OE topographical vocabulary, the notions of *specialised use* and *consistency* that are so central to the argument are not discussed in any detail in either study. This leads to a number of problems when the general validity and implications of the Gelling hypothesis are to be considered. While it is clear from the descriptions given in [*PNL*] and [*LPN*] that there is variation between the topographical terms in terms of the degree of precision, it is not clear how many of the terms the authors would have considered to have a specialised meaning. This inevitably makes any evaluation of the validity of the hypothesis for the place-names of a particular area difficult as it is not clear how far variation in the meanings and uses is to be expected, and, indeed, accepted for the hypothesis to be still considered as valid.
>
> (*HPND*, 264)

Nurminen's solution is to introduce a three-fold scale illustrative of degrees of specialization and consistency. The labels 'highly specialised', 'specialised', or 'not specialised' are then applied to the 29 hill-terms cited by Gelling and Cole for the 1,577 place-name examples of *LPN*. To achieve a direct comparison with *LPN*, the 11 most frequently occurring hill-terms in the study focus areas (*Appendix B*) are also labelled according to an analysis of their physical dimensions.[74] *HPND* presents supporting evidence for this three-fold labelling using tables and graphs, photographs, drawings based on photographs, and distribution maps. However, this methodology, as applied, has four issues.

Firstly, the labels 'highly specialised', 'specialised', or 'not specialised' are not themselves clearly defined in the study. The illustrative utility of such labels is not in question; the present study adopts a comparable system, inspired by *HPND*, in presenting the results of *toponymic triage* (§4.1). But, it is vital that the attribution of qualitative labels be amenable to re-examination and for identical results to be obtainable by other researchers. Unfortunately, without clear criteria to guide the selection of one label over another, the process is subjective and not replicable.

[74] Measurements (in metres) of hills, hill-spurs and hill-areas is recorded for height above sea-level, length, and width. The average gradient of slopes is expressed as a percentage.

Secondly, *HPND* proceeds from numerical expressions (metrics and percentages) of incidence, magnitude and gradient – frequently derived from inevitably small samples – to direct evaluations that appear to express statistical significance. Conclusions reached in this way contrast values that are not directly comparable in statistical terms. If a recognized method of statistical hypothesis testing had been applied, the relationship between results for individual topographical elements could have been reliably established and this would have permitted the thresholds of 'highly specialised', 'specialised', or 'not specialised' to be defined statistically, and thus be replicable. A formula such as: 65% of place-names in element X must have parameters indicative of descriptor Y to be classed as 'specialised', and 85% to be 'highly specialised' is needed to clarify how these labels differ. It is not possible from *HPND*'s classification alone to reapply these terms to the characteristics of Berwickshire hills and hill-spurs because the thresholds along the continuum of specialization are not quantified nor the system of their attribution transparent.

Thirdly, *HPND* (Table 4.39, pp. 266–267) bases the ascription of specialization labels on descriptions in *LPN*, and then extends this classification to the amassed data for Northumberland and County Durham. In essence, this is a comparison of labels in abstraction without a demonstrable and quantifiable link between label and actual data. Nurminen cautions that *LPN*'s examples 'focus heavily on instances which provide the best and clearest examples of specialized uses' (*HPND*, 264) with the obvious issue that 'internal consistency' (*HPND* Research Question 2, p. 28) is not measurable since data, including exceptions to the norm, are omitted. In practice, only the characteristic of *specialization* can be examined by *HPND*'s methodology whilst *consistency* cannot, despite the fact that both are deemed to be 'so central to the argument' (*HPND*, 264). Nurminen acknowledges the adoption of a different model in her conclusions (pp. 269, 316), replacing *consistency* with a concept of frequency across a spectrum of meaning (*HPND*, 316 – §2.1.2).

Regrettably, *HPND* (p. 316) does not set out its evidence in a manner that clearly shows a 'continuum of meanings' exists for each hill-term; indeed, for many there are too few available examples for statistically significant continua to be determined. Table 4.40 (*HPND*, 268) concludes the labels of 'specialised' or 'highly specialised' can be attributed with confidence to just six out of 22 Old English hill-terms found in the focus areas.[75] Given that just under three-quarters of the Old English elements examined for Northumberland and County Durham show inconclusive results due to the unavailability of test examples, it is difficult to concur that the validity of the GCH has been established by this method.

One solution to these issues would be to compare test data directly with measured examples cited by *LPN*. After all, the place-names quoted by Gelling and Cole can be viewed as *canonical* of the GCH, and thus may be legitimately assumed to give a hypothetical standard against which to measure deviation. Such a 'canonical range' for each hill-term would permit the re-examination of *LPN* examples with a view to testing parameters vs. elements. Also, an established range of values would offer a standard against which to evaluate hills and hill-spur data from non-*LPN* examples. For these reasons, a statistics-based approach will be adopted to analyse Berwickshire data in Chapter 5, and to evaluate the internal consistency of the examples cited by *LPN* in Chapter 6.

Lastly and crucially, *HPND*'s method of defining the perimeter of hills and hill-spurs is unclear. For metrics to be meaningful and replicable, the boundaries of a relief-feature need to be defined. If *HPND* had recorded these, perhaps by including NGRs for the terminal points between which 'length', 'breadth', and 'gradient' were measured and calculated, then the system for obtaining these parameters might have been replicable by others and thus become applicable elsewhere.

[75] The tally is 21 if we follow Gelling and Cole (*LPN*, 216–218) and Smith (*EPNE* ii, pp. 104–106) in treating *scylfe* and *scelf* as variants of the same element.

3.1.3.3 Conclusion

HPND is a remarkable piece of work which has painstakingly assembled historical forms and produced sound place-name etymologies for a huge corpus in areas that scarcely benefit yet from coverage by SEPN volumes. Therefore, like *NPSB* (§3.2.2), Nurminen breaks wholly new ground. The consideration of every place-name and the review of all names containing possible hill-terms are methodological steps that will be emulated and adapted here in Chapter 4.

Attempting to summarize core aspects of *HPND*, with a view to replicating these, has clarified and suggested several refinements and alternative approaches. It was the initial intention of this thesis to adopt *HPND*'s methodology in every respect and so create a Berwickshire dataset to articulate with it, thereby contributing to one aim of the REELS project 'to advance understanding of the relationship between place-names on either side of the present Scottish-English border'.[76] This review has worked towards that goal by undertaking a very detailed examination of Nurminen's methodology and data. In so doing, it has become apparent that within the timeframe of the current research, such a comparison would be impracticable because the metrics of the *HPND* dataset would require recalculation using a standardized procedure. Nevertheless, the high quality of the data amassed by *HPND* makes this desideratum an obvious project for future consideration (§8.3).

Although the issues flagged by this review are critical in part, it is freely acknowledged that *HPND* has provided a developed and very significant starting point towards finding a workable test of the GCH in Scotland and elsewhere. Equally, Nurminen's thesis demonstrates the need for new tools and protocols to quantify topographical features so that

[76] 'Recovering the Earliest English Language in Scotland, evidence from place-names'. <https://berwickshire-placenames.glasgow.ac.uk/project-information/>, accessed November 2018.

an objective appraisal of the relationship between place-names and geomorphology can made.

3.2 Studies of Berwickshire Place-Names

Prior to the REELS project (2016–2019) there had been no systematic examination of Berwickshire place-names other than *The Place-Names of Berwickshire* (*PBWK*). Numerous Berwickshire examples, mostly of Germanic linguistic origin but touching also on names coined in Celtic languages, are included in Williamson's doctoral thesis *The Non-Celtic Place-Names of the Scottish Border Counties* (*NPSB*). Nicolaisen (1976) refers to 59 Berwickshire names although all but six of these are based upon *NPSB* and will not be reviewed further here.[77] The most recent investigation is Dunlop's unpublished doctoral thesis 'Breaking Old and New Ground: A Comparative Study of Coastal and Inland Naming in Berwickshire' (§1.4.4; §4.4–§4.4.2).

3.2.1 *The Place-Names of Berwickshire*[78]

> The names which we have been obliged to leave almost wholly unexplained are very few.
>
> (*PBWK*, 12)

PBWK comprises a 34-page dictionary of 590 head-names preceded by a short *Introduction* outlining the textual and cartographic resources utilized and speculating about the historical 'races' and languages that appear to have contributed to the evolution of Berwickshire place-names. Sixteen percent of the head-names are recycled largely verbatim from

[77] Nicolaisen's additional names are: Auchencrow CHM, Berwickshire BWK, Castle Mains DNS, Primrose BUP, *Shatteby* CHM, and Snuke CSM.
[78] The circumstances by which this volume came to be published are reconstructed in Grannd (in preparation).

Johnston 1934.[79] However, a close comparison reveals *PBWK* citing more historical forms for places in Berwickshire than appear in the earlier volume. Embedded within the *Introduction* and the dictionary entries are a further 94 place-names attributed to the county, which have not been accorded the status of head-names.

No clear criteria appear to determine which place-names are included in the dictionary. Johnston asserts:

> We have tried to give every name, not purely commonplace or quite modern, mentioned in the maps of Pont and Arrowsmith and in the present-day Ordnance Survey maps, one inch to a mile.
>
> (*PBWK*, 8)

This claim is false. *REELS* offers a corpus against which to compare the volume of coverage. That dataset consists in 1,183 head-names extracted from the most recent 1:50,000 scale OS maps (approximately 1¼ inches to one mile), augmented by a further 385 from the six *PNBWK1* parishes at 1:25,000 scale (approximately 2½ inches to one mile), giving a total of 1,607 current head-names, 765 (48%) of which are not considered by *PBWK.*[80] Admittedly, a negligible number of new names may have been coined since its publication in 1940, but that does not account for the scale of *PBWK*'s omission, even allowing for the author's own rejection of the 'purely commonplace or quite modern'.[81]

The sources cited by *PBWK* are often unclear; a common criticism of Johnston's other publications (e.g. Hyde 1917, 558). This fact combined with the high level of inaccurate transcription from sources, means absolutely nothing of this work can be taken at face value. Ninety-five names offer no historic forms, seven do not appear in the sources cited, and three cite sources that cannot be traced; thus 105 names (15%) appear without supporting

[79] This amounts to 94 head-names, three of which are not within the study area (§1.4.3): Berwick NTB, Muttonhole ROX, and Oldhamstocks ELO.
[80] These totals reflect the *REELS* corpus accessed on 1 March 2021.
[81] The most recently coined Berwickshire place-name appears to be Loch Rickie CHM, named by (Robert) Bryan Keatley (1930–2012), who created the artificial loch as a nature reserve, dedicating it to the memory of his son, Richard (1967–2000).

evidence. There is no bibliography, and the lack of an index is unhelpful in locating place-names not referenced alphabetically in the body of the dictionary. Similarly, some sources mentioned in the *Introduction* by name are not linked to the abbreviations referring to them.[82] Historical forms are generally undated, compelling the reader to scan through the *Introduction* in hope of finding an approximate date from the source.[83] However, many source abbreviations are never explained and the reader is left to guess their meanings.[84]

One of Johnston's main sources is 'Pont', 'dat[ing] back to about 1610' (p. 7). None of the 46 historical forms citing Pont is actually taken from that map-maker's manuscripts – the originals of these are lost. The attributed forms have been extracted from *Blaeu (Pont) Mercia* and *Blaeu (Pont) Laudelia*, which date from 1654, and reflect Pont's original orthography as interpreted by his Dutch typesetters. *RMS* is another main source which although it usually has an indication of date does not include the volume or charter-number.

The *Introduction* of *PBWK* has an annotated list of 51 generic elements ('name endings') identified in the corpus. These are presented as suffixes in Scottish Standard English orthography, often accompanied by an Old English generic and translation, and frequently an Old Norse cognate is included for good measure. The interplay of historical languages that might have resulted in the evolution of the names discussed is seldom traced. That a place-name may have been coined in Scots of any period using lexical borrowings from other languages is never signalled nor apparently understood. A typical example would be:

> *-cairn* seems only in Calcairn, Gael. *càrn*, 'cairn, heap, and often hill'
> (*PBWK*, 13)
>
> CALCAIRN BUSHES, Burnmouth: Doubtful as to Cal-, but cf. O.Gael. *call*, 'a hazel.'
> (*PBWK*, 24)

[82] These include: '*Colds. ch.*' = *Cold. Cart.*; '*Dryb. ch.*' = *Dryburgh Lib.*; '*Kelso ch.*' = *Kelso Lib.*; '*Mel. ch.*' = *Melrose Lib.*.; '*Mel. Reg.*' = *Melrose Recs.*; '*New Stat. Acct.*' = *NSA*; '*O. Stat. Acct.*' = *OSA*; '*Ret.*' = *Retours*.
[83] For example: '*Arrows*.' = 'Arrowsmith's wall-map 1807–41' (pp. 8, 16), cited on 23 occasions.
[84] Examples include: '*chart*.' (pp. 35, 19), '*Durh. ch.*' (pp. 26, 29, 35, 41), '*Forster*' (pp. 25, 40), '*Home ch.*' (pp.18, 19), 'Macfarlane *Collections*' (pp. 12, 13, 31, 50, 51, 52), '*Reg. Pal. Durh*.' p. 46), '*Sprot*.' (p. 13), '*St. And. ch.*' (p. 52).

Neither 'O.Gael.' nor 'Gael.' appear in the list of abbreviations (pp. 16–17). Catcairn Bushes MRD (NT968596) is a coastal feature, and although it appears as *Cateairn Bushes* [*sic*] on the 1862 OS Six-inch 1st edition map (BWK sheet XII), this is amended to *Catcairn Bushes* in line with the *OSNB* entry on all subsequent editions. 'Calcairn' is never documented except by Johnston.

Referring to *CPNS*, Johnston finds 'his survey of Berwick […] rather perfunctory', since the emeritus Professor of Celtic Languages, History, and Antiquities of the University of Edinburgh cites only 14 names of possible Celtic origin. Juxtaposing Watson's assessment with his own, Johnston vaunts a tally of 'seventy names or more [that] may be looked upon as probably Celtic'.[85]

Fig. 3.1. Boon Hill LEG (viewed southwards from NT 56859 47816) ?< OE *bune* 'a drinking vessel'.

Johnston's overwhelming preference is to ascribe Gaelic origins to Lowland place-names, although uncharacteristically, *PBWK* (p. 8) rejects two of Watson's proposed Gaelic

[85] There are 76 place-names listed (pp. 8–9).

etymologies.[86] Powskein PEB is not in Berwickshire as Johnston correctly states, but he does not comment on its linguistic origins. The other reject, Boon LEG, is etymologized from $_{\text{G}}$ *bun* by Watson (*CPNS*, 139), whereas *PBWK* prefers a derivation from $_{\text{ESc}}$ *bund* 'a bound, a boundary, the acreage within a boundary', and suggests it shares that element with neighbouring Boondreigh Water and its upper reaches, Boondreigh Burn (*PBWK*, 22). A transferred sense of $_{\text{OE1}}$ *bune* 'a drinking vessel', or more tentatively $_{\text{OE2}}$ *bune* 'reed', are the current *BWKR* proposals for the settlement-name.[87] There is a conspicuous cup-like hollow in the north-west face of Boon Hill at NT 56813 46973 (Fig. 3.1), which if correctly identified as the eponymous 'vessel' would parallel another container word $_{\text{OE1}}$ *cyrn* applied to a shallow depression in the hill-slope at Chirnside CHS (Fig. 3.2). Container metaphors are particularly common in connection with landscape (Hough 2016a, 20–21).

Fig. 3.2. Chirnside CHS < $_{\text{OE}}$ *cyrn* 'a churn' (viewed south-southeastwards from NT 86484 55994).

[86] Robb (1996, 173, fig. 4) concludes Johnston 1934 cites a Gaelic origin for 84% of all the Lowland (as defined pp. 171–172) place-names surveyed, compared with 58% in Nicolaisen 1976, and 60% for 'Watson 1926' (*CPNS*).

[87] Early forms include: *Bune* 1185×1189 *Melrose Liber* i no. 108; *baronie de Bowne* 1410 *RMS* i no. 918; *the Water of Bowndrich* c.1680 *Geog. Coll.* iii, 172; *Boundrich* c.1680 *ibid.*; *Boon Drich* 1752 x 1755 *Roy*.

Notwithstanding the occasional flash of genuine insight, Watson's assessment of the Rev. James B. Johnston's early scholarship summarizes well the actual, if limited, usefulness of practically everything he ever wrote about place-names:

> So far as the Celtic names are concerned, the value of Mr. [*sic*] Johnston's book consists in the lists themselves, the old forms, and the occasional derivations (*e.g.* of Aeron) by Celtic scholars; except in the case of straightforward names, which bear their meaning on the surface, the author's philological equipment in Celtic is inadequate.
>
> (Watson 1915, 284)

Attempting to utilise Johnston's data (§4.5) will demonstrate that even the historical forms cited in *PBWK* can be taken only as signposts to the actual sources (where these can be traced) but no reliance can be placed on the accuracy of transcription.

3.2.2 'The Non-Celtic Place-Names of the Scottish Border Counties'

The original manuscript of *NPSB* is a 443-page doctoral thesis submitted to the University of Edinburgh in October 1942. Although it was produced in the same era as *PBWK*, with access to the same historical documents and resources, the contrast in detail, insightfulness, and reliability could not be greater. Such utility led SPNS to digitise and publish it in 2009, as detailed in Bill Patterson's new *Preface*.[88] It is noteworthy that few researchers of southern Scotland and northern English place-names appear previously to have been able to benefit from it due to issues of accessibility (§3.1.1). Undoubtedly, SPNS has performed a very useful service in making it more readily available.[89]

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[88] The SPNS edition bears no date. The year of publication was deduced from its inclusion in *Scottish Place-Name News*'s Bibliography for 2009 (See: Taylor and Hough 2009). References in the current study are to the pagination of the digitized edition.
[89] Of works consulted for the present research, *NPSB* is referenced only by Nicolaisen 1976, *PNFIF1* (2006), Wood 2007, and Drummond 2007b. If the regulations restricting its use and accessibility had been more accommodating to researchers, it may well have proved useful to Matley 1990, Pratt 2005, Fox 2007, and perhaps *HPND* (2012).

Furthermore, *NPSB*'s continuing value to twenty-first-century toponomastics can be gauged from the fact *REELS* references it on 76 occasions in discussing Berwickshire etymologies. Williamson's sound methodology and perspicacity combine to make it an extremely valuable resource, undiminished by subsequent advances in scholarship and the interpretation of individual place-name elements during the intervening 70 years.

The main body of the work is preceded by an extended discussion, in 12 sections, of the historical, geographical, and linguistic context of its study area: Dumfriesshire, Selkirkshire, Roxburghshire, and Berwickshire. *NPSB* breaks with the emerging format of its day, later standardized by SEPN (*PWLO*, v), of surveying place-names grouped by parish within whole counties, a practice that had begun to be emulated in Scotland during that era (e.g. *PWLO*; Johnson-Ferguson 1935). Instead, as Williamson's main subject is a non-Celtic linguistic survey across four counties, she chooses to divide her investigation by language of origin: 'Old English Place-Name Endings' (pp. 1–70), 'Middle English Place-Name Endings' (pp. 70–111), and 'Scandinavian Place-Name Endings' (pp. 111–128). Within each of these divisions generic elements are grouped broadly as 'habitative' (pp. 1–28, 70–78, 111–115, 127–128) or 'topographical' (pp. 28–70, 78–111, 115–126) across a further 94 sub-sections. These cite historical forms and provide an analysis of all place-names containing the target element within each county. Within sub-sections, head-names are further grouped alphabetically by county and within counties. This arrangement, along with an index of every toponym examined, is of great benefit to researchers re-using this material.[90]

Despite its principal concern being place-name elements, *NPSB* lacks an index of the generic elements themselves. Also, the apparently haphazard sequence, in which elements currently appear in each of the three main divisions, bears only a loose resemblance to a thematic arrangement as found, for example, in the chapters of *LPN*. Providing a revised

[90] Minor drawbacks arising from this layout are discussed in §4.3.

SPNS edition with a comprehensive index would make locating all references to individual elements more straightforward.

The corpus of *NPSB* was compiled from OS 1" 'Popular' edition maps, supplemented by place-names documented in historical sources before 1600.[91] Each head-name includes a parish abbreviation and map grid reference, followed by historical forms, dating and source information, and a discussion of the place-name. Sub-sections have an introductory paragraph discussing each element's meaning, often with general observations on its linguistic development and spatial distribution.

Appendix D (Vol. II) was created from *NPSB* by extracting the 163 'topographical' element sub-sections together with the 917 toponyms these analyse. Williamson mentions there being in excess of 1,011 further topographical place-names that were not included in the corpus due to the unavailability of early forms; most frequent amongst which is the ubiquitous term *hill* with over 400 unspecified instances. These unprovenanced and excluded place-names are tallied in Table 3.2, 'var.cos' column. The 65 'habitative' elements of *NPSB* were not extracted or analysed further, but they are estimated to comprise at least 400 examples. This would bring the total number of non-Celtic place-names considered by Williamson to approximately 2,400. It should be noted that language attributions in *NPSB* (see Table 3.2) may not always reflect modern perspectives. Of the 917 'topographical' place-names fully examined, 381 are linked to 42 hill-terms, of which 91 place-names (17 hill-terms), lie within the present study area. This material will be re-examined in the next chapter in compiling a corpus of Berwickshire hill-terms (§4.3).

[91] The maps used to create *NPSB* are not cited, but the style of referencing by sheet number and grid square identifier indicate the following One-inch 'Popular' Maps (1925–26) were used: 74 Edinburgh; 75 Dunbar & Lammermuir; 80 Peebles & Galashiels; 81 Kelso; 84 Nithsdale & Moffat; 85 Hawick & Eskdale; 86 The Cheviot Hills; 88 Dumfries; and 89 Solway Firth & River Esk, available at <https://maps.nls.uk/os/one-inch-popular/index.html>.

Element	BWK	DMF	ROX	SLK	var.cos	Total
ME *banke*	0	4	3	2	33	**42**
OE *berg*	1	3	5	0	0	**9**
MSc *bray*	1	1	1	0	20	**23**
ON *brekka*	0	1	0	0	0	**1**
OE *brū*	0	2	0	0	0	**2**
OE *clif*	2	0	3	0	0	**5**
OE *cofa*	0	4	0	0	0	**4**
ModSc *craig*	0	0	0	0	27	**27**
OE *dodd*	2	3	1	1	4	**11**
OE *dor*	0	0	0	1	0	**1**
ModSc *drum*	0	1	0	0	0	**1**
OE *dūn*	6	0	9	0	0	**14**
ME *edge*	0	0	0	0	11	**11**
ON *eyrr*	0	1	0	0	0	**1**
ON *fjall*	0	11	4	2	0	**17**
ON *gnípa*	0	1	0	0	0	**1**
OFr *haunch*	0	1	0	0	0	**1**
ME *height(s)*	0	0	0	1	0	**1**
ME *heved*	1	15	7	5	46	**74**
ModE *hill*	0	0	0	0	> 400	**> 400**
OE *hlāw*	25	5	26	4	> 120	**> 180**
OE *hlync*	0	1	0	1	0	**2**
OE *hōh*	11	4	12	2	0	**29**
ON *hreysi*	0	3	0	0	0	**3**
OE *hyll*	5	17	12	4	0	**38**
OE *hyrst*	0	1	1	0	0	**2**
MSc *kaim*	2	0	0	0		**2**
ModSc *knock*	0	1	0	0	0	**1**
MSc *knowe*	1	2	4	0	154	**161**
OE *mōr*	5	0	3	1	0	**9**
OE *mōr*, ModSc *muir*	1	9	2	1	29	**42**
ME *nese*	1	0	2	0	0	**3**
OCelt **pennos*	2	4	4	2	0	**13**
OE *pīc*, ON *pík*	0	1	4	1	0	**6**
MSc *rigg*	13	7	7	3	102	**132**
OE *scanca*	0	0	0	0	9	**9**
OE *shoulder*	0	0	0	0	3	**3**
OE *sīde*	12	5	14	0	50	**81**
ON *sker*	0	4	1	1	0	**6**
MSc *steil*	0	0	1	2	0	**3**
MSc *tae*	0	1	0	0	3	**4**
OE *tang*, *twang*	0	0	2	0	0	**2**
Total:	**91**	**113**	**128**	**34**	**> 1,011**	**> 1,377**

Table 3.2. The incidence per county of *NPSB* toponyms and hill-terms (element forms are original).

3.2.3 'Breaking Old and New Ground: A Comparative Study of Coastal and Inland Naming in Berwickshire'

BONG is a 731-page doctoral thesis in two volumes, submitted to the University of Glasgow in May 2016. Volume I comprises eight chapters, which explore and contrast coastal- and inland naming patterns in north-eastern Berwickshire. Volume II contains two appendices, comprising a gazetteer of place-names and a selection of transcribed and translated North Durham Charters (*ND*). Copious maps and high-quality photography obtained through extensive fieldwork complement the text and inform its conclusions. An article (Dunlop and Hough 2014), exploring aspects of colour terms and their differential patterns of application to inland and coastal place-naming, is based on one of the main strands of Dunlop's research. *BONG* is clear, reliable, and offers very few obstacles to being mined for early forms and data to supplement *REELS* and *NPSB*. Unlike the other sources of assembled Berwickshire place-names, it requires no further introduction, although in the next chapter a review of particular toponyms will offer in passing a more detailed flavour of its quality (§4.4). The datasets, BONG1 (*Appendix E*) and BONG2 (*Appendix F*), will be compiled from extracted and reanalysed data.

3.3 Conclusion

This chapter has reviewed previous research on Berwickshire place-names and undertaken a detailed examination of studies that set out to test the GCH in southern Scotland and north-eastern England. Insights gained in the course of these reviews will guide this study's evaluation of the GCH in Berwickshire.

It is axiomatic that toponyms assembled to investigate the GCH should actually manifest the intended target elements. Yet, to achieve a high degree of certainty an element is actually present in a place-name is far from straightforward. Within a typical research project timeframe, it is really only practicable to use data derived from surveys of a comparable standard to SSPN and SEPN. Even then, it is likely to be beneficial and aid transparency if a clear record is kept cataloguing the reason for inclusion of all toponyms advanced to evaluate the hypothesis. Doing so allows erroneous examples to be quickly identified and resolved. In fact, recording the selection process creates a means to track and test the sequence of decisions that builds a test corpus. Since neutralising the potential for researcher bias is one aim of this thesis (§1.3.4), it seems prudent to closely document the stages of data compilation.

It has been useful to clarify the easily-overlooked fact that toponyms falling within the scope of the GCH comprise two components: a topographical feature and a settlement named by association. Aspiring to accurately identify both in every case has emerged as a crucial step. But once again, the variable of researcher involvement in the interpretation of locations, and whether one (the settlement) or both are documented, can play a significant role in determining which relief-feature is measured. Creating a mechanism to ensure identical replicable principles inform these processes would also be supported by recording the manner and level of researcher intervention.

Finally, even when the 'what to test' has been established, the issue remains of 'what to test it against'. *HPND*'s approach, comparing descriptors of the topographical elements in *LPN* against its own descriptors (based on metrics of test data), proved useful to an extent, e.g. 'Of the commonest hill-terms, both *dūn* and *hōh* are attested in the place-names of the study area with highly specialised meanings which are consistent with those described in [*LPN*]' (*HPND*, 267). By this method, a measure of homogeneity between Nurminen's study area and the rest of England could be established. She was also able to reach important conclusions regarding the utility of testing minor and late first-attested names.

Nevertheless, a better alternative to comparing labels may perhaps be a comparison using metrics of the actual places cited by Gelling and Cole. At this stage it is unclear whether the 'canonical' toponyms of *LPN* are themselves homogenous within hill-term groupings. In investigating these possibilities, a final factor to have emerged from the foregoing reviews is whether subjectivity in the method of testing can be controlled or even eliminated.

The next chapter will seek to address issues around in the compilation of corpora to test the GCH in Berwickshire, whilst Chapters 5 and 6 will explore a novel means to measure and compare the relief-features of Berwickshire and *LPN* with a minimum of researcher involvement.

METHODOLOGY AND BERWICKSHIRE CORPORA

Chapter 4

4.0 Summary

This chapter charts the preparation of data to test whether the GCH operates in Berwickshire. The methodological steps detailed below have evolved from the practicalities and issues of compiling and sifting large place-name corpora amassed by others for a different purpose, be that a whole- or partial county survey, as with *REELS*, *BONG*, and *PBWK*, or studies across multiple counties in the case of *HPND* and *NPSB*. Although Berwickshire place-names, and specifically those with hill-terms, are the present focus, this methodology could be applied to the preparation of any corpus assembled to test the operation of systematic place-naming.

Transparency with regard to how the corpora to be tested have been assembled is essential for replicating the methodology. Therefore, the decisions taken at each step of the process will be recorded and all data considered in reaching any conclusions will be included as appendices, so that the justification for inclusion or exclusion of any given place-name is verifiable.

Three corpora of Berwickshire place-names, BWK1, BWK2 and BWK3, will be the product of this chapter: BWK1 groups pairs of settlements and their associated relief-feature(s) by hill-term, ranked for a range of variables that determine certitude of the identification; BWK2 comprises the same data for hills, for which there exists no identifiable settlement; and BWK3 functions as an alphabetical index to BWK1, BWK2, and the Berwickshire sections of Vol. III, although some of its contents will be generated by Chapter 5. These corpora are an amalgam of data drawn largely from *REELS*, *NPSB*, *BONG*, and *PBWK*, augmented by original research.

The review of previous studies in the Chapter 3 suggests the GCH might be tested north of the English border by repeating aspects of *HPND*'s investigation of Northumberland and County Durham. Nurminen begins with a consideration of all place-names on 1:50:000 scale maps of her study area (*HPND*, 38) before selecting representative parish clusters to research in depth. The current study diverges from *HPND* in its second methodological step, although every place-name will nonetheless be initially considered. This divergence of approach underlines the central tenet of this study that place-names to be evaluated against the GCH must be representative not only in terms of density, volume, and the distribution of quantifiable generic elements, but they must manifest the same topographical stereotypes as Gelling and Cole's own examples, albeit allowing for variation in local geology and linguistic history.

Essentially, the methodology adopted will focus on the validation process by which place-names are deemed to fall within the scope of the hypothesis whilst setting aside the remainder. This *triaging*, i.e. establishing whether a name is relevant for typological investigation, will be piloted in the next section using the 34 place-names examined by Pratt 2005 (§3.1.1). Although the triage criteria for selection are based on *HPND*'s methodological stages 'onomastic interpretation' and 'topographical analysis' (pp. 37–50), the current elaboration of that approach will instead underscore consistency and replicability in the application of criteria for corpus inclusion. It will also represent the evaluation process visually.

4.1 Toponymic Triage

In the compilation of her corpus, Nurminen (*HPND*, 39–40) classifies the reliability of each suggested etymology. She labels as *certain* place-names whose hill-term: (a) has only one possible etymological interpretation; (b) is plausible given the terrain; and (c) has an etymology fully consistent with historical spellings. Etymologies are labelled *uncertain* unless all three criteria are satisfied. She qualifies this:

> It should be emphasised that this classification, while necessary for practical purposes, is an oversimplification as in reality, there are no absolutely certain occurrences, and there is also considerable variation among the uncertain occurrences as to the degree of uncertainty, with the probability of the occurrences ranging from highly unlikely to probable.
>
> (pp. 39–40)

Nurminen's classification is elaborated here to create a criteria-based filter for selecting and documenting the reasoning any given place-name is deemed suitable to test the GCH. This procedure, termed *toponymic triage*, ascribes seven broad labels in three corresponding degrees: *certain* ('proven'); *uncertain* ('very probable' or 'probable'); or *excluded* ('unproven', 'unlikely', 'very unlikely', or 'inadmissible').

Classification	∑	***Triage Label***
'excluded'	**0.0**	*inadmissible*
	0.5	*very unlikely*
	1.0	*unlikely*
	1.5	*unproven*
'uncertain'	**2.0**	*probable*
	2.5	*very probable*
'certain'	**3.0**	*proven*

Table 4.1. Toponymic triage for corpus inclusion: the correspondence between classification, ∑, and triage labels.

These labels, summarized in Table 4.1, are attributed by assigning a numerical value to *HPND*'s three criteria – henceforth: *Etymology*, *Terrain*, and *Sources* – scored 1.0 for complete fulfilment; 0.5 for partial fulfilment; or 0.0 for non-fulfilment (i.e. the available evidence is very weak or non-existent). The sum of these gives a summation-score (∑).

The ∑ for each place-name is paired to a colour-coded triage label to visually convey the cumulative degree of reliability. Place-names with ∑<2.00 are judged to have too few corroborating factors to be used to test the GCH. Thus, the triage labels 'unproven, 'unlikely', 'very unlikely', and 'inadmissible' are statements of non-testability; the toponym in question may genuinely conform to the principles of the place-naming system proposed by Gelling and Cole, but on the available evidence alone such an example is just as likely to skew any evaluation of the corpus and lead to false conclusions.

In effect, the triage criteria for ***Etymology***, ***Terrain***, and ***Sources***, are graded answers to three questions:

a) ***Etymology***: *In a compound or simplex name, does the etymology define one element or are other hill-terms plausible?*[92] This is scored:

1.0	if there is only one plausible hill-term; or
0.5	if one hill-term over several is preferred;[93] or
0.0	if no definite hill-term can be identified.[94]

b) ***Terrain***: *In a compound or simplex name, is there a match of terrain to a hill-term connotation of the element?*[95] This is scored:

1.0	for a total match; or
0.5	for a partial match;[96] or
0.0	for no match at all.[97]

[92] The ascription of language codes in *REELS* ranks degree of certainty. These have equivalent triage scores: 1:0 for 1 'certain'; 0:5 for 2 'probable'; or 0:0 for 3 'maybe'. It is to be hoped that future SSPN databases will continue the very useful practice of *REELS* in indicating the level of certainty ascribed to etymological elements.
[93] In the fully developed triage table, multiple hill-terms in the same name, as oppose to multiple interpretations of the same element, are allocated individual table-rows (§4.2.1.1). Each hill-term under evaluation there is shown in bold.
[94] All three criteria are scored 0.0 if there exists doubt a place-name contains a hill-term at all, or if a non-hill-term sense definition for the proposed element is the more plausible (§4.2.2).
[95] As characterized in *LPN*. Sense definitions of hill-terms that occur in Berwickshire are collated in Table 4.7.
[96] This includes the frequently encountered situation of a *co-appellative* relief-feature name not being documented, often because the settlement is sited on it, and so their association must be inferred. See §4.2.3 for a full discussion of the term *co-appellative* and its application to the elaborated triage methodology.
[97] This means that no obvious or definitive relief-feature in the vicinity can be considered co-appellative, or more than one feature could have inspired the original coining of the place-name.

c) ***Sources***: *Are historical forms available?*[98] This is scored:

1.0	for sources originating 1100–1450 and earlier (ONtb > ESc); or
0.5	for sources originating 1450–1700 (MSc); or
0.0	for sources originating 1700–present (ModSc and SSE), or if historical sources are unavailable.

It may be observed criterion c) is more complex than criteria a) and b). It scores both the availability of historical forms and their degree of usefulness for determining the evolution of the name through time; the assumption being the earlier a source the greater its potential to provide significant evidence. In practice, criterion c) cannot be separated from a) since determining whether a hill-term is a component of a place-name relies almost entirely on the availability and reliability of historical forms. Nevertheless, focussing separately on the greater potential of the oldest historical forms allows the final corpus to be graded into broad chronological bands that may be studied in isolation. The gradation of responses to the question posed by criterion c) could be based on the chronological phases of any relevant language. In this study, phases in the development of Scots are used since all but the most recent Berwickshire place-names have been mediated through that language for almost the entire historical period. Scots is also the vernacular in which a very large proportion of surviving place-names appears to have been coined. ∑ is intended to convey the *relative likelihood* a given hill-term is present in an individual place-name, as well to record the decision-making process by which that conclusion was reached. Ultimately, the elaborated version of toponymic triage (§4.2–§4.2.6) aims to establish there exists a demonstrable *co-appellative* relationship (§4.2.3) between topographic settlement-names and the terrain.

[98] In this study, historical forms are any written versions of a place-name from sources earlier than the most recent OS maps. Place-names without a modern OS standardized orthography are treated under their most recent historical form and indicated by italics (except in Volume III, where italic vs. non-italic font differentiation is not possible for technical reasons).

Element	Place-name	Etymology	Terrain	Sources	∑	Testability
OE *clif*	Lilliesleaf ROX	1.0	1.0	1.0	3.0	*proven*
	Wyrmsclif (Wormerlaw) BWK	1.0	1.0	1.0	3.0	*proven*
	Clifton Craig DMF	1.0	1.0	0.0	2.0	*probable*
	Rockcliffe DMF	1.0	1.0	0.0	2.0	*probable*
OE *denu*	Hassendean ROX	1.0	1.0	1.0	3.0	*proven*
	Collydean FIF	0.0	0.0	0.0	0.0	*inadmissible*
	Deanburnhaugh ROX	1.0	1.0	0.0	2.0	*probable*
	Denholm ROX	0.0	1.0	1.0	2.0	*probable*
OE *dūn*	Duns BWK	1.0	1.0	1.0	3.0	*proven*
	Gordon BWK	1.0	1.0	1.0	3.0	*proven*
	Hownam ROX	1.0	1.0	1.0	3.0	*proven*
	Hadden ROX	1.0	1.0	0.5	2.5	*v. probable*
	Graden ROX	1.0	1.0	0.0	2.0	*probable*
	Tullibody CLA	0.0	1.0	0.0	1.0	*unlikely*
	Coalden FIF	0.0	1.0	0.0	1.0	*unlikely*
	Denny STL	0.0	0.0	0.5	0.5	*very unlikely*
	Cardenden FIF	0.0	0.0	0.0	0.0	*inadmissible*
OE *hēafod* / Sc *head*	Burnhead DMF	0.0	0.5	0.0	0.5	*very unlikely*
	Loanhead MLO	0.0	0.0	0.5	0.5	*very unlikely*
	Mersehead Sands KCB	0.0	0.5	0.0	0.5	*very unlikely*
	Dykehead LAN	0.0	0.0	0.0	0.0	*inadmissible*
	Dykehead STL	0.0	0.0	0.0	0.0	*inadmissible*
OE *hōh*	Howpasley ROX	0.5	0.5	0.5	1.5	*unproven*
	Howwood RNF	0.0	1.0	0.0	1.0	*unlikely*
	Elcho PER	0.0	0.0	0.0	0.0	*inadmissible*
	Ratho MLO	0.0	0.0	0.0	0.0	*inadmissible*
ON *nes*	Bo'ness WLO	1.0	1.0	1.0	3.0	*proven*
	Southerness KCB	1.0	1.0	1.0	3.0	*proven*
	Gartness LAN	0.0	0.0	0.0	0.0	*inadmissible*
	Gartness STL	0.0	0.0	0.0	0.0	*inadmissible*
OE **ofer* / OE **ufer*	Gleniffer Braes RNF	0.0	1.0	0.0	1.0	*unlikely*
OE *scelf*	Skelfhill ROX	1.0	1.0	0.5	2.5	*v. probable*
OE **scēot*	Shotts LAN	0.0	0.5	0.5	1.0	*unlikely*
	Shotton DRH	0.0	0.0	0.0	0.0	*inadmissible*

Table 4.2. Toponymic triage applied to Pratt 2005.

4.1.1 Re-examination of Pratt 2005 using Toponymic Triage

Toponymic triage of the place-names cited to test the GCH in Pratt 2005 is given in Table 4.2. In parallel with an application of the principles just outlined, the efficacy of triaging will be evaluated through a detailed reinvestigation of each of Pratt's examples, drawing upon both advances in the field and resources that have become available since that research was undertaken. Observations, grouped alphabetically by generic element, are as follows:

4.1.1.1 $_{\text{OE}}$ ***clif*** 'slopes are 45° or steeper…frequently a river-side feature…inland escarpments and rock faces'.[99]

An Early Scots reflex of $_{\text{OE}}$ *clif* has not been previously established. *DOST* cites only four examples for $_{\text{MSc}}$ *clift*, *clyft*, the cognate of $_{\text{ME}}$ *cliff*, although some instances of this element appear to denote a declivity rather than a hill, suggesting an alternative derivation from the past tense of $_{\text{MSc}}$ *cleve*, *cleif* 'to cleave, to split'. By way of comparison, *NPSB* can offer only five examples of $_{\text{OE}}$ *clif*.[100] Turning to published surveys, Fife has no Scots examples and only one instance of $_{\text{SSE}}$ *cliff* (*PNFIF5*, 334). The four toponyms cited in Pratt 2005 (two of which *NPSB* considers) might be tentatively ascribed to the Old Northumbrian (pre-1100) stratum of place-naming. Such an origin would dovetail well with the earliest attestation in Scotland of $_{\text{ESc}}$ *crag* (c. 1145 – *DOST*), the ubiquitous synonym of $_{\text{OE}}$ *clif* in its steep / rocky / precipice senses.[101] This would perhaps suggest $_{\text{OE}}$ *clif*^{4} was superseded in the toponymicon by the Gaelic loanword after Old Northumbrian had morphed into Early Scots and thus $_{\text{ESc}}$ *clif* was productive for only a short period.[102]

[99] This definition has been updated in the 2014 edition of *LPN* – §4.3 under *Wyrmsclif* (Wormerlaw).
[100] *Alnecliue* ANM; Clifton MBT; Lilliesleaf LIL; *Shollesclif* LGT; and *Wyrmsclif* ECC (*NPSB*, 8; 58). As Patterson highlights in his preface to the digitized version of *NPSB*, Williamson groups her evidence under 'Old English' headings without attempting to differentiate coinings that modern practice would assign to the various stages in the evolution of Scots.
[101] Elsewhere in Scotland the cognate $_{\text{ON}}$ *klif* might also have been considered as an alternative, but in Berwickshire the near complete absence of Old Norse place-names and elements precludes this possibility (see fn. 207).
[102] See Table 4.7 also for the various senses of $_{\text{SSE}}$ *craig* and $_{\text{ModSc}}$ *craig* < $_{\text{ESc/MSc}}$ *crag* < $_{\text{G}}$ *creag*.

4.1.1.2 OE ***denu*** 'a main valley'.

Although Coalden FIF, Cardenden FIF, and Denny STL are likely to contain this element, Pratt 2005 does not examine them in this context and so they are not scored under *denu* in Table 4.2. The Middle Scots reflex is 'a hollow where the ground slopes on both sides; generally, such an (*sic*) one as has a rivulet running through it; a small valley' (*DOST* DENE *n*.[1]). Of Pratt's examples, Deanburnhaugh ROX, Denholm ROX, and Hassendean ROX are located beside small streams with names referencing the *denu*, through which each flows. Despite her reservations, all three correspond well to the accepted definition. Standing near the intersection of four tributaries of the Teviot, Denholm confirms Pratt's derivation as an Old English dative plural, *denum* 'at the valleys'. Collydean FIF is Modern Scots or Scottish Standard English, demonstrating that these elements were still productive c.1811 (*PNFIF2*, 370). Indeed, Sc *den* and SSE *dean* are current lexical terms for a narrow valley or ravine that is usually wooded (*CSD2*). Despite the fact these elements ultimately derive from Old English, Collydean, as a recent coining, is not a test of OE *denu*. Therefore, it scores 0.0 for *Etymology*.

4.1.1.3 OE ***dūn*** 'hill, upland expanse, low hill with a fairly level and…extensive summit'.

OE *dūn* is suggested as the generic in nine examples (pp. 100–101). Three of these must be rejected as derived ultimately from a different element, OE *denu* 'valley'. Pratt (p. 96) observes it can be difficult for researchers to distinguish place-names in *dūn* from those in *denu*. She also comments (p. 94) that Gelling and Cole's description of *dūn* (*LPN*, 164–167) as a settlement-site, either on a low flat hill or adjacent to one, made it 'usually easy to find something that matched in the area', and 'this would seem to provide an explanation that fits just about any circumstance'. Nurminen makes a similar observation (*HPND*, 264). Such ambiguity clearly has the potential to undermine the integrity of the GHC. With the benefit of more recent advances in research, it is necessary to refute some of Pratt's conclusions whilst sympathising with the obstacles she faced. Coalden FIF $_{\text{Sc}}$ *coal* + $_{\text{Sc}}$ *den* (*PNFIF1*, 103), Cardenden FIF $_{\text{en}}$ *carden* + $_{\text{Sc/SSE}}$ *den*, a nineteenth-century new settlement near the narrow winding valley of the Den Burn (*PNFIF1*, 101), and Denny STL do not contain $_{\text{OE}}$ *dūn* or even its later Scots reflexes. Although the derivation is far from conclusive, the last seems more likely to be a reflex of $_{\text{OE}}$ *denu* (*NTCB*, 82; Dorward 1995, 49), characterized as 'mostly used of long, narrow valleys with two moderately steep sides and a gentle gradient along most of their length' (*LPN*, 114, citing Cole 1982, 86, which refines the definition proposed in Gelling 1976, 925). This description fits the location of Denny STL just below the emergence of the River Carron from a long sinuous glen of classic *denu* shape, which incidentally carries a road – another frequent attribute of place-names in $_{\text{OE}}$ *denu* (*LPN*, 114). Denny, if it originated as a simplex, appears to have preserved the unstressed syllable of the feminine dative, *dene* 'at the valley'. Alternatively, if transmitted via Gaelic, it has acquired the 'dative-locative' *-(a)idh*, often suffixed at a fairly late date to simplex hydronyms (*CPNS*, 440–444). Pratt's remaining example, Tullybody CLA, derives not from $_{\text{OE}}$ *dūn* but $_{\text{G}}$ *dùn* 'fortress, hill', later displaced by $_{\text{G}}$ *tulach* 'hill' (*NTCB*, 182) as shown by the sequence of early forms: *Dunbodeuin* 1147; *Dumbodenum* c. 1160; *Tullibotheny* 1195 (Pratt 2005, 101). The other names in *dūn* are relatively unproblematic.

Of the remaining 17 examples in Pratt 2005, all but four (Howpasley ROX, Bo'ness WLO, Southerness KCB, and Skelfhill ROX) were flagged by triage as unlikely to contain the target elements. A review of additional published sources, some of which were not available to Pratt, confirm in each case that exclusion from the corpus is justified. This highlights the paramount importance that generic elements cited to test the GCH do actually occur in the place-names being examined and is the main *raison d'être* for the methodology described in this chapter. Too few examples were available to adequately assess the elements $_{\text{OE}}$ *hēafod* / $_{\text{Sc}}$ *head*; $_{\text{OE}}$ *hōh*; $_{\text{OE}}$ **ofer* / **ufer*; and $_{\text{OE}}$ **scēot*. *NPSB* corroborates that these elements are indeed rare in southern Scotland and offers no instances of either**ofer* / **ufer* or **scēot*, and only one for *hēafod*: Swineside Hall ROX (*NPSB*, 95). However, Williamson does cite 27 'definite' and two possible instances of place-names in OE *hōh*, including from Berwickshire: Head Chester CBP (p. 24); Howlaws GRE (alternatively < OE *holh*, p. 52); Kelloe EDR (p. 52); and Hume HUM < OE *(æt þæm) hōhum* (p. 57).

4.1.1.4 OE ***hēafod***, Sc ***head*** 'head, end, source'.[103]

The five examples cited do not correspond with the observation made by *LPN* for settlement-names in OE *hēafod*:

> There are a number of instances where it clearly refers to a piece of land which juts out below the level of the rest of the massif, and this may be connected with the manner in which some animals, such as pigs and badgers, habitually carry their heads below the level of their shoulders.
>
> (*LPN*, 175)

None of Pratt's examples involves a relief-feature possibly frequented by the animal named in the specific. This and the quoted sense are considered admissible to the GCH because they refer to settlements where OE *hēafod* is a *landform* (§5.2.1), especially one that is laterally, as oppose to vertically, salient. Although other senses are recorded from later Old English (*DOE*, s.v.), Gelling is careful to differentiate references to topography from other applications. As noted (§2.2.3), for Gelling it is the perceptions of the earliest Anglo-Saxons that are crucial to the hypothesis (*LPN*, xix). Pratt's examples reflect some of the alternative sense definitions of Sc *heid*:

Mersehead Sands KCB[104] – 'the top, or principal extremity, of various objects.' (*DOST* HEDE^5 *n*.);

Loanhead MLO – 'the upper end of a town, street, or passage' (*CSD2* HEID^4 *n*.$^{1.1}$);

Burnhead DMF[105] – 'the head of a river or valley' (*CSD2* HEID^3 *n*.$^{1.1}$); and

Dykehead LAN, Dykehead STL – 'situated at the head or top' (*CSD2* HEID^2 *n*.$^{1.3}$).

[103] A detailed review of the topographical sense definitions of this element are included in diPaolo Healey 2016.
[104] Pratt 2005 gives the county as Dumfriesshire.
[105] Inverness-shire is given as the county, whereas the article's discussion (p. 103) appears to refer to Dumfriesshire.

Apart from OE *mersc*, the specific elements of these place-names are ubiquitous across Lowland Scotland. The *head* in each of the above characterises not the appearance of the terrain but the location of the place at a furthest extremity. For example, Mersehead Sands is named from Mersehead Farm (NX 92608 55960), located at the end of a spectacular area of marshland.[106] The inclusion in Pratt 2005 of place-names unsuitable to test the GCH underlines the importance of clearly differentiating senses denoting hill-shape. This issue will be considered in more detail below (§4.2.2).

4.1.1.5 OE ***hōh*** 'heel, a ridge rising to a slight point and concave end'.

Of the article's four examples of OE *hōh*, only Howpasley ROX is a remote possibility. Apart from the relatively common compound OE *hōh-tūn*, this element rarely occurs as a specific, and whatever *-pasley* may have signified in its original language, the rarity of OE *hōh* having this function casts doubt on Howpasley as an example. Howwood RNF is almost certainly formed not from OE *hōh* but Sc *how* 'a depression, esp. in the ground; a low-lying area of some extent' (*DOST* HOW[2] *n.*[1]) – a meaning better supported by the topography. In the early nineteenth century, Sc *how* was still the local interpretation of this element; its anglicization to *Hollowwood* led one commentator to bemoan that such usage 'ought to be discouraged, not only being in bad taste, but also as leading to doubt and confusion in identifying the name of the place' (Anonymous 1842, 1, 889). *Hollowwood* occurs in some eighteenth- and nineteenth-century sources (e.g. Taylor and Skinner 1776) further strengthening a derivation from Sc *how*. Elcho PER and Ratho MLO are more plausibly ascribed to Celtic origins and are therefore not relevant to an examination of OE *hōh*: '*Elcho* near Perth is in 1281 *Elyoch* … apparently for [G] *ailcheach*, stony place' (*CPNS*, 479). *Ratho* MLO is '*Ratheu* 1258, *Ratho*

[106] Mersehead Farm is now an RSPB reserve. Images showing its location can be found at <https://www.rspb.org.uk/reserves-and-events/find-a-reserve/reserves-a-z/reserves-by-name/m/mersehead/about.aspx>, accessed November 2016. See Table 4.7 for more detailed sense definitions of Sc *heid* and SSE *head*.

1292, *Rethew*/*Retheu* 1306-29 [...] "the (place of) forts or raths" v. G. *rath* W. *rhath*: "a circular fortified place", pl. *rhathau*; see *CPNS* 355' (*PMLO*, 349).

4.1.1.6 ON ***nes*** 'nose'.

Bo'ness WLO and Southerness KCB may contain ON *nes* or OE *nes* / Sc *nes*. Gelling and Cole suggest these cognate terms overlap in signifying a piece of land projecting into lakes, marshes, or the sea, but in an Old Norse context the element may also denote much larger geographical areas (*PNL*, 173; *LPN*, 197). Modern Scots names in -*ness* could derive from either language. Taylor (2007, 510) highlights the absence of settlement-names in -*ness* and suggests it became productive comparatively late. Other than Kirkness KNR, which he convincingly argues as Old Norse, place-names in -*ness* on mainland Scotland appear exclusively to be coastal features. Indeed, Bo'ness has been shown to be a comparatively late formation from an earlier simplex (*PWLO*, 25, 32; *NTCB*, 56). Southerness (NX 97835 54155) is a late eighteenth-century re-formation, having ousted an earlier *Salterness*.[107] Gartness LNK (NS 78281 64386) and Gartness STL (NS 50214 86653) are anglicized names containing G *gart* 'a field (of arable or pasture land)' (*eDIL* GORT[Ia] *n*.[1]) making a Gaelic specific more probable for the second element. Each place has a waterfall in the immediate vicinity strongly suggesting they represent G **Gart an Easa* 'the field of the waterfall'.

4.1.1.7 OE ****ofer***, OE ****ufer*** 'flat-topped ridge with a convex shoulder'.

Gleniffer Braes RNF, the only example cited for this predominantly southern Old English hill-term, scores as *unlikely*. Whilst the upland area to the south of Paisley could be characterized by OE **ofer* / **ufer*, this name is more likely to have a Celtic origin given its

[107] 'Jocelin, bishop of Glasgow, for Holm Cultram Abbey; he has granted, at the request of Roland, son of Uhtred, a saltpan in Southerness [vna salina in Salternes]' 1190×1199 *SEA* i, 87. Early forms include: *Saturnesspoint* 1750 *Dorret*; *Saturness Lighthouse* 1752–5 *Roy*; *Salterness* 1795 *OSA*; *Southerness Point* 1797 *Ainslie*; and *Southerness Point* 1854 *OS 6" KCB*, XLVII.

remoteness from areas of early Old English settlement. In England, **ofer* / **ufer* usually has modern reflexes with a medial /v/ or /∅/ rather than /f/. Looking to a possible Celtic origin, /-f-/ is a rare phonological sequence, apparently confined to lexical borrowings from Latin.[108] Older residents near Gleniffer Braes still pronounce the place-name /ˌɡləˈnifər/[109] which confirms the earliest reference to it, made by local poet, Robert Tannahill (1774–1810), who half-rhymes *Braes o' Gleniffer* with the stress pattern *met wi' my lover*. Alan James tentatively suggests the modern pronunciation /ˈɡlɛnəˌfər/ may show reanalysis on the pattern of the personal name *Jennifer*. Either G *gleann* or Br **glïnn*, both 'narrow valley', (*BLITON* 2, 145) would make suitable candidates for the unstressed generic element, identifiable perhaps with the deep and narrow Gleniffer Glen (NS 46361 60715), which has now attracted an epexegetic Sc *glen*. A possible Celtic specific with /-f-/, likely to be a Latin loanword, could be supplied by G *ifrinn* 'hell' or G *aifreann* 'mass, offering', with the first the less improbable. Its orientation due north-south perhaps lends the high-sided Gleniffer Glen a chthonian ambiance since it receives little direct sunlight even in the brightest weather.[110]

4.1.1.8 OE ***scelf*** 'very flat wide summit'.

The single example of *scelf*, Skelfhill ROX, scores as *certain*. Early forms, if available, would most likely confirm this to be the correct derivation given the comparative flatness of the eponymous hill (NT 45709 05187) in an otherwise steeply undulating landscape. An alternative from the cognate ON *skjalf* is improbable given the rarity of Old Norse elements in the general area (see *HPND*, 57; and fn. 207).

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[108] I am grateful to Alan James for this insight.
[109] Personal correspondence with local informant, Alan Steel (February 2017).
[110] This element occurs as the specific in Irish townland and river-names: Ifreannach / Effrinagh LET; Ifearnóg / Iffernock MEA; Ifrinn- / Hell River CLA; and Sruthán na hIfreannaí / Effernagh River DON (*Logainm*, s.nn.).

4.1.1.9 OE ***scēot*** 'slope, steep place'.

Shotton DRH is not relevant to the investigation of the GCH as applied to Scottish toponyms. Shotts LAN, the other example cited for OE **scēot*, almost certainly contains Sc *shot* 'a division of land; ?a smallholding' ?< OE *scēat*(*a*) (*CSD2* SHOT, *n.*3). Drummond comments on Shotts LAN:

> A *shot* is a 'a division of land, a smallholding' (*DOST*), and with this simple meaning it is not surprising to find other settlements of this simplex name in AYR, DMF and STL. The name of this instance was the remnant of the earlier form which indicated land owned by one Bertram (the genitival *s* having merged with the initial *s* of the generic) in the same manner that *house*, *field* or *toun* names were often preceded by a personal name to distinguish them.[111] Within the parish [SHO], there are two other names containing the element *shot*, *viz.* Biggarshot # and Collyshot, both of which also appear to contain a personal name (although the latter is a very late name).
>
> (*PNLAN1* – forthcoming).

4.1.2 Conclusion

A comparison between these observations (§4.1.1.1–§4.1.1.9) and Table 4.2 shows toponymic triage can predict which place-names in Pratt 2005 are likely to contain the target topographical elements. The parallel investigation of historical forms and review of the literature available to Pratt, or published since, confirms the results of scoring and tallying the three criteria. ∑<2.0 flagged weakly evidenced names and proved to be a strong predictor of reliability even within this admittedly small sample. The 15 place-names in Table 4.2 with ∑≥2:0 (cells shaded in the blue spectrum) could be used to test the GCH. The remainder, with ∑<2.0 (cells shaded in the red spectrum), were excluded because the supporting evidence for these is too slight.

[111] *Bartremeschotis* 1488 *RMS* ii no. 1784; *Bertrameschottis* 1511 *RMS* ii no. 3635 [*Ecclesie de Bertrameschottis*]; *Bartramschottis* 1579 *RMS* iv no. 2899; *Bartoumschottis (Bartrumschottis?)* 1580 *RMS* v no. 5; *Barthramschottis* 1581 *RMS* v no. 218; *Schots* 1583×1614 *Pont* 34. I am grateful to Pete Drummond for permission to quote from his forthcoming SSPN volume.

4.2 REELS data

REELS, an online research repository of Berwickshire place-name data (§1.4.2), includes reliable etymologies, the historical forms underpinning these, and a variety of contextual information. This dataset comprises 1,601 Berwickshire head-names, of which 1,181 appear on the most recent Ordnance Survey 1:50,000 scale (Landranger) maps.[112] In creating *PNBWK1*, an additional 211 names were included from the 1:25,000 scale (Explorer) maps, and a further 209 from other sources. It should be noted that the associated publicly accessible digital publication, *The Berwickshire Place-Name Resource* (*BWKR*), is restricted to place-names appearing on the 1:50,000 scale maps and so has 420 fewer head-names than *REELS*.[113] In implementing the methodological stages to be detailed presently (Table 4.3), 121 additional Berwickshire place-names and name-variations meriting inclusion were identified from the historical sources cited by *REELS*. These augment the tally to 1,781 spreadsheet rows representing 1,722 head-names. This expanded *REELS* corpus will be progressively sorted into two data sub-sets using an elaborated version of toponymic triage; the first (REELS1) will comprise place-names with hill-terms admissible to test the GCH, and the second (REELS2) those that are inadmissible.[114]

REELS2 (final – *Appendix B*) will comprise place-names without testable hill-terms in both their current and historical forms. Ultimately, the investigation of the names in REELS1 (final – *Appendix A*) will contribute to three further sub-sets (BWK1, BWK2, and BWK3 – *Appendices I*, *J*, and *K*). Toponymic triage aims to ensure that BWK1 contains only co-appellative place-names – *co-appellative* describes the pairing (<>) of a topographical

[112] *HPND* also used maps at this scale in the compilation of its *Appendix A* (§3.1.3).
[113] For comparison, *OSNB* working at a scale of 1:10,560 (six inches to one mile) lists 4,300 head-names for Berwickshire. <https://scotlandsplaces.gov.uk/digital-volumes/ordnance-survey-name-books/berwickshire-os-name-books-1856–1858?display=placenames>, accessed December 2016.
[114] *BWKR* can be downloaded from <https://berwickshire-placenames.glasgow.ac.uk/api/v1/>. *REELS* actually contains 1,608 head-names, but the following lie outwith Berwickshire so defined (§1.4.3): Bell Stones NTB; Grot Heugh NTB; Harpertoun Strip ROX; Island Side NTB; Kitchen Craigs NTB; Long Craig NTB; and Round Knowe NTB. The data presented here were accessed most recently on 21 December 2019. The resource itself is reviewed in Hough 2019.

feature with a proximal settlement where the sense of the generic element strongly suggests naming by association (§4.2.3). BWK2 collates singleton relief-names for possible future separate investigation although this will not form part of the current analysis (§7.3). BWK3 will be an alphabetical index to BWK1 and BWK2, and ultimately to Vol. III (§5.3.3).

Triage Stage	***Section Title***	***Action***
1	REELS1 and 2	Initially, all place-names are assigned to REELS2. Any head-names or historical forms with apparent hill-terms are transferred to REELS1 (provisional) and reviewed for: multiple hill-terms, multiple hill-features, multiple etymologies, hill-term variation, renaming, obsolete historical forms, derivative names, and transferred names. The last two categories are returned to REELS2.
2	Element sense-definitions	A sense number is ascribed to each REELS1 hill-term. Rows with senses from Table 4.7 deemed *inadmissible* are returned to REELS2.
3	Co-appellatives	Descriptive formulae in the format •R•<>•S• are applied to paired relief-feature names / 'identities' and settlement-names in REELS1 (§4.2.3). Missing *complements* (q.v.) are restored. Singleton •S• are returned to REELS2. Singleton •R• are retained in REELS1.
4	Hill-term function	The remaining REELS1 hill-terms are flagged to permit separate future evaluation by function. The categories are primary generics (G_1); secondary generics, including epexegetics (G_2); specifics (S_p); simplexes (S_x); or those of uncertain function (U_n).
5	Toponymic triage	REELS1 is scored for the three triage criteria. REELS2 (final) comprises place-names inadmissible to test the GCH.
6	Compilation of BWK1 and BWK2	REELS1 (final) co-appellatives with ∑≥2:0 are transferred to BWK1; singleton •R• with ∑≥2:0 are transferred to BWK2.

Table 4.3. Toponymic triage stages applied to *REELS*.

4.2.1 Stage 1 – REELS1 and REELS2 (provisional)[115]

REELS data were downloaded as a Microsoft Excel spreadsheet resulting in 1,601 rows (one per toponym) and 1,057 columns. Such a high number of columns reflects the capacity of the online database to record for each name: up to 12 historical counties, 64 historical names, and six etymological elements, with multiple fields and referencing, along with locational, map, and sundry information (e.g. aspect and altitude). Many spreadsheet cells appear blank as in practice most head-names require only a fraction of this capacity. Surplus fields and extraneous information were removed from the downloaded dataset and augmented by the additional 121 place-name variants extracted from *REELS* historical forms. All were arranged into a provisional version of REELS2 with five core columns:

Place-name	***Par.***	***Class.***	***NGR***	***Etymology***
Legerwood Hill	LEG	•R•	NT 58613 41647	$_{en1}$ *Legerwood* + $_{SSE1}$ ***hill***

A subscript language abbreviation plus the REELS certainty code (1 = *certain*, 2 = *probable*, 3 = *maybe*) was prefixed to each etymological element. In the above example for Legerwood, the specific and $_{SSE}$ *hill* are shown to be *certain* ($_{en1}$ and $_{SSE1}$). The etymology field of REELS2 was then reviewed. Possible hill-terms were flagged in bold, and rows with such elements extracted to a provisional version of REELS1. This isolated an initial corpus of 700 Berwickshire head-names with 69 potential hill-terms referring to all 11 OS feature classifications.

Table 4.4 groups these elements by language. Subsequent investigation will eliminate elements that are doubtfully attested and introduce additions that emerge during the process of investigation (see Table 4.13 and Table 4.14). The preliminary inclusion of names that ultimately might not be evaluated against the three triage criteria (Stage 5) serves several

[115] In examining *REELS* data through the six triage stages the contents of REELS1 and REELS2 will fluctuate until the final versions are produced. To avoid unnecessary repetition, the provisional versions of datasets are not included in the *Appendices*.

purposes. Any toponym containing likely or possible hill-terms in languages known or presumed to have existed in the study area (§3.1.2.1, fn. 53) will have been extracted by this process.

Brittonic (6)	**blajn*, **bre*, **brïnn*, **brun*, **dīnas*, **ros*
Early Scots (5)	*bell, heved*, *knoll*, *law*, *side*
Gaelic (3)	*druim*, *dùn*, *ros*
Old English (8)	*bune*, *dūn*, *hlāw*, *hōh*, *hyll*, *nes*, *nesu*, *sīde*
Scots (28)	*bank*, *bell*, *brae*, *cairn*, *clint*, *craig*, *dod*, *doun*, *drum*, *edge*, *fell*, *heid*, *heuch*, *hill*, *hirst*, *kame*, *kippie*, *knock*, *knowe*, *knowlie*, *law*, *nes*, *pike, rig*, *ross*, *side*, *snuke*, *steel*
Scottish Standard English (19)	*bank*, *bell*, *brae*, *cairn*, *craig*, *craigie*, *edge*, *head*, *headrig*, *heuch*, *hill*, *knowe*, *law*, *mount*, *point*, *ridge*, *rig*, *side*, *steel*

Table 4.4. REELS1 hill-terms after triage Stage 1.

Such a catch-all approach seeks to minimise potential bias in the selection of examples to investigate the GCH, whilst avoiding the neglect of settlements or relief-features not named at 1:50,000 scale or included among the 544 *REELS* head-names additional to *BWKR*. For example, Heugh Hill LAU •R• NT 56637 49706 is included in *REELS* since it is named on Landranger Sheet 73, whereas its co-appellative, Heugh LAU •S• NT 57707 48232, is not named (at that scale) and so is omitted.[116] This illustrates the issue that reliance on *REELS* alone would risk topographical settlement-names or features of possible interest to this study being overlooked. The review of *REELS* historical forms and other studies involving Berwickshire names seeks to ensure the inclusion of all place-names relevant to a comprehensive survey of hill-terms.

The subsequent discovery of Berwickshire toponyms related to *REELS* head-names has methodological implications for the etymological category 'existing name' ($_{\text{en}}$). For example, Hillhead Plantation LKK •V• NT 88315 46877, clearly a derivative from an unattested

[116] Strings of data in the format shown summarize the following information: modern place-name orthography; pre1975 civil parish(s) abbreviated to three letters – see *Parish Abbreviations*; Ordnance Survey feature classification letter, flanked by bullets – see *OS Classification Codes*; and National Grid Reference (six-digits, accurate to 100 x 100 m; ten-digits accurate to 1 x 1 m).

**Hillhead* •S• or **Hill Head* •R•, is etymologized as $_{\text{SSE1}}$*hill*^{1} + $_{\text{SSE1}}$*head*^{1} + $_{\text{SSE1}}$*plantation* rather than $_{\text{en1}}$*Hillhead* + $_{\text{SSE1}}$*plantation.* If either the associated settlement or relief-feature emerges in the course of research, the etymology of Hillhead Plantation and similar derivatives will require revision. Conversely, an assumption that names are derivative (§4.2.1.6) rather than primary coinings is occasionally confirmed by the same sequence of deduction; e.g. Spylaw Plantation CSM •V• NT827397, etymologized with $_{\text{en1}}$*Spylaw*, is returned to REELS2 at the end of Stage 1 because of the subsequent discovery of *Spy Law* CSM •R• NT 82881 39637 and Spylaw CSM •S• NT 82973 39851 from a historical source (*Armstrong*). On balance, the occurrence of such minor anomalies does not detract from the reliability of this valuable resource.

The process of initial review also extracts to REELS1 hill-terms that function as epexegetics; a category included for the present to avert the omission of place-names with genuine hill-terms that might have only survived as derivatives or secondary generics (§4.2.4). This first trawl also nets place-names with hill-term senses that do not refer primarily to hill-shape, as well as others where the original connotation is ambiguous due to a lack of supporting evidence. Investigating such names systematically has prompted the development of the main triage stages. A comparison between the final versions of REELS1 and REELS2 (Table 4.15) will be made to generate statistics on the incidence and distribution of topographical settlement-names at parish and county levels.

The relationship of dataset head-names to hill-terms is not a straightforward one-to-one. Place-names can: contain multiple hill-terms, refer collectively to more than one feature, have a range of etymologies comprising one or more elements, include partial or wholly different names for the same locus at different times, or combine several of these possibilities in the same toponym. Ensuring all occurrences of the relevant elements are evaluated against the landscape feature to which they refer requires head-names to be categorized consistently for all possible presentations. This will be achieved through the creation of additional dataset rows so that each element is tested against a single site. In the following subsections (§4.2.1.1–§4.2.1.6), the methodological issues arising from the variety of presentations found in Berwickshire hill-names will be discussed.

4.2.1.1 Toponyms with Multiple Hill-terms

Where the review of REELS1 identifies a place-name with two or more suspected hill-terms, a spreadsheet table-row is created for each:

Place-name	***Par.***	***Class.***	***NGR***	***Etymology***
**Fawside Hill*$_{\{}$[117]	HUM	•R•	*NT 68301 41143	$_{\mathrm{Sc1}}$ *faw* + $_{\mathrm{Sc1}}$ *side* + $_{\mathrm{SSE1}}$ ***hill***
**Faw Side*$_{\{}$	HUM	•R•	*NT 68301 41143	$_{\mathrm{Sc1}}$ *faw* + $_{\mathrm{Sc1}}$ ***side***
Falsidehill$_{\{}$	HUM	•S•	NT 68301 41143	

A subscript opening brace ($_{\{}$) is suffixed to such names to alert the reader to the existence of multiple forms or related head-names in separate *Appendix* rows. This is necessary because such names will not 'sort' contiguously in spreadsheets or be predictable from indexes without cross-referencing; for example, **Faw-* and *Fal-* in the above example are not alphabetic. Elements functioning as epexegetics, specifics, and simplexes (e.g. Knock Hill DNS) are also ascribed individual table-rows to allow for their separate analysis. The element under examination in each row is highlighted in bold:

Place-name	***Par.***	***Class.***	***NGR***	***Etymology***
Knock Hill$_{\{}$	DNS	•R•	NT 74487 55121	$_{\mathrm{Sc1}}$ ***knock*** + $_{\mathrm{SSE1}}$ *hill*
Knock Hill$_{\{}$	DNS	•R•	NT 74487 55121	$_{\mathrm{Sc1}}$ *knock* + $_{\mathrm{SSE1}}$ ***hill***
Knock	DNS	•S•	NT 75303 57529	

An exception to the practice of creating additional rows is made when affixes (e.g. wester / easter; upper / nether; etc.) are the only differential. These reflect a more recent subdivision

[117] See §4.2.3 on the inference of unattested co-appellative complements and of loci; both are indicated by prefixed asterisks.

of older land-units; the unaffixed name being taken to represent an original undivided farm (*PNFIF5*, 363). In such instances, the settlement at the lowest altitude is presumed to be the original locus for classification purposes. Although this is somewhat arbitrary, cultivatable soils at a lower altitude do generally offer better prospects for farming and are therefore more likely to have been the earliest exploited in a given area. In the absence of a full archaeological survey, the true original location of most settlements remains unproven since there is always the possibility a current habitation zone has migrated from an earlier site along with its name.

4.2.1.2 Relief-names with Multiple Hills

Occasionally, a single settlement is named in association with two or more relief-features with what amounts to a collective name. In these instances, each hill is ascribed its own locus (NGR), and unless the associated settlement is sited on one of them, spreadsheet rows are necessary for both the settlement and all associated relief-features. These are differentiated by a suffixed subscript number ($_{1,\ 2,\ \text{etc.}}$):

Place-name	*Par.*	*Class.*	*NGR*	*Etymology*
**Camber Law*$_1$	WRR	•R•	NT 65736 50510	$_{\text{Sc2}}$ *camber* + $_{\text{Sc1}}$ ***law***[1]
**Camber Law*$_2$	WRR	•R•	NT 65507 50411	$_{\text{Sc2}}$ *camber* + $_{\text{Sc1}}$ ***law***[1]
Cammerlaws$_{\{}$	WRR	•S•	NT 65551 50480	

Further examples from REELS1 include the settlements: Duns DNS, Whitsome Laws WHI, and Fellowhills LKK. The first is most likely to be **Dūnas* (pl. of $_{\text{OE}}$ *dūn* – §4.2.1.3; §7.5). Fellowhills LKK is slightly unusual in that it refers not only to multiple relief-features, but the proposed hill-term, represented by *-low-*, has multiple etymologies ($_{\text{OE1}}$ *hlāw* and $_{\text{Sc1}}$ *law* – §4.2.1.3) with the added complication of an epexegetic ($_{\text{SSE1}}$ *hill*). It is possible that the development of **Foal Law* > **Fellow* was influenced in part by the visual impact of this pair of small similarly-profiled features appearing to be 'fellow hills'.[118] As multiple rows are required to assess each hill-shape and hill-term separately, Fellow Hills$_{1\ \&\ 2}$ could potentially require six (2 x 3) table rows between them, with Fellowhills •S• generating a further three (1 x 3). In practice, in this and other sections, the multiplication of rows for each hill-term, site, and etymology is minimized by specifying the etymology only against the relief-feature, and if multiple loci exist for that name, against the relief-feature suffixed '$_1$', thus:

Place-name	***Par.***	***Class.***	***NGR***	***Etymology***
Fellowhills$_1$	LKK	•R•	NT 87852 48638	OE/ESc1 *fola* or Sc1 *foal* + OE1 ***hlāw*** or Sc1 *law* + SSE1 *hill*
Fellowhills$_1$	LKK	•R•	NT 87852 48638	OE/ESc1 *fola* or Sc1 *foal* + OE1 *hlāw* or Sc1 ***law*** + SSE1 *hill*
Fellow Hills$_1$	LKK	•R•	NT 87852 48638	OE/ESc1 *fola* or Sc1 *foal* + OE1 *hlāw* or Sc1 *law* + SSE1 ***hill***
Fellow Hills$_2$	LKK	•R•	NT 87846 48478	
Fellowhills$_{\{}$	LKK	•S•	NT 88164 48680	

Identical head-names occur occasionally in the same civil parish and are recognisable by a comparison of NGRs and parish abbreviations. Although these are not relief-features with a collective name in the manner just described, such instances are also assigned separate spreadsheet-rows and a suffixed subscript number. The following examples show single hills at separate locations ($_{1\ \&\ 2}$) within the same parish, which incidentally also have multiple hill-terms ($_{\{}$):

Place-name	***Par.***	***Class.***	***NGR***	***Etymology***
Bell Hill$_{1\{}$[119]	CHM	•R•	NT 83861 66159	ESc1 ***bell*** + SSE1 *hill*
Bell Hill$_{1\{}$	CHM	•R•	NT 83861 66159	ESc1 *bell* + SSE1 ***hill***
Bell Hill$_{2\{}$	CHM	•R•	NT 91462 68031	SSE1 ***bell*** + SSE1 *hill*
Bell Hill$_{2\{}$	CHM	•R•	NT 91462 68031	SSE1 *bell* + SSE1 ***hill***

[118] *OSNB* (OS1/5/26/13) describes Fellow Laws as: 'Two small heights immediately adjoining each other (sic) and which give name to the farm on which they are situated'.
[119] See §4.4.2 for further discussion of this toponym.

Fellowhills LKK and the 2x Bell Hill CHM illustrate an important difference regarding relief-names with multiple hills; the first is effectively a set, whereas the last refers to coincidentally identical names. This distinction will operate later in the triage process when determining which spreadsheet rows, referring to relief-names with multiple hills, count as co-appellatives (§4.2.3).

4.2.1.3 Hill-terms with Multiple Etymologies

The origin of a given element along a linguistic continuum can seldom be determined conclusively. *Head* in a current Berwickshire place-name could derive from $_{\text{OE}}$ *hēafod*, $_{\text{ESc}}$ *heved, hevid*, $_{\text{Sc}}$ *heid*, or $_{\text{SSE}}$ *head*. This issue is frequently encountered with place-names whose first appearance is late in the written record and which could plausibly have been coined in Scots or Scottish Standard English, as previously discussed (§1.4.2.1). In general, only the earliest reliable linguistic stage need be analysed without the creation of multiple table-rows. Conversely, where two or more possibilities merit separate consideration, then multiple table-rows can be created to facilitate this:

Place-name	*Par.*	*Class.*	*NGR*	*Etymology*
Drummaw$_{\{}$	MRD	•R•	NT 95287 58803	$_{\text{G2}}$ ***druim*** or $_{\text{Sc1}}$ *drum* + $_{\text{G2}}$ *magh*
Drummaw$_{\{}$	MRD	•R•	NT 95287 58803	$_{\text{G2}}$ *druim* or $_{\text{Sc1}}$ ***drum*** + $_{\text{G2}}$ *magh*

In this example, although $_{\text{Sc}}$ *drum* derives from $_{\text{G}}$ *druim*, the lack of a Scots alternative to $_{\text{G}}$ *magh* makes consideration of $_{\text{G}}$ *druim* necessary despite it having a weak *REELS* certainty rating ($_{\text{G2}}$). The context, provenance, and dating of the other elements in a compound toponym are always considered in attributing a language label, and ultimately such conclusions are reflected in the triage value assigned to the *Etymology* criterion. It should be emphasized that *REELS* etymologies are viewed as provisional; the processes of selection and triaging are themselves explorative and on occasion may lead to revision.

In the following unusually complex example, Duns is a simplex settlement-name with multiple possible etymologies (§4.2.1.1), G *dùn* or OE *dūn* or Br **dīnas*. In addition to the hill-term, the associated relief-feature has also attracted an epexegetic Sc *law*. Thus, Duns Law contains multiple hill-terms. But (*Meikill*) Duns Law the main eponymous hill and original site of the town stands some 684 m from a companion, Little Duns Law (Sc1 *little* + en1 *Duns Law* – which despite its name being differentiated by an affix, still requires a separate row for its own locus). Thus Duns ?< OE *dūnas* (pl.) also references multiple hills (§4.2.1.2; §7.5).

Place-name	*Par.*	*Class.*	*NGR*	*Etymology*
Duns Law{	DNS	•R•	NT 78474 54703	G3 ***dùn*** or OE2 *dūn* or Br3 **dīnas* + Sc1 *law*
Duns Law{	DNS	•R•	NT 78474 54703	G3 *dùn* or OE2 ***dūn*** or Br3 **dīnas* + Sc1 *law*
Duns Law{	DNS	•R•	NT 78474 54703	G3 *dùn* or OE2 *dūn* or Br3 ***dīnas*** + Sc1 *law*
Duns Law{	DNS	•R•	NT 78474 54703	G3 *dùn* or OE2 *dūn* or Br3 **dīnas* + Sc1 ***law***
Little Duns Law{	DNS	•R•	NT 78347 55364	Sc1 *little* + en1 *Duns Law*
Duns{	DNS	•S•	NT 77780 54379	

Occasionally, competing etymologies exist between a choice of putative hill-terms and non-hill-term elements. In the next example, Sc *dun* 'dull brown' (*DOST*) does not require a separate row in the triage table despite it being an alternative etymology to G3 *dùn* 'a hill, hillock, mound' (*Dwelly*), whereas SSE1 *law*, representing a secondary generic, requires separate analysis. Only actual hill-terms are accorded individual spread-sheet rows:

Place-name	*Par.*	*Class.*	*NGR*	*Etymology*
Dun Law{	CHK	•R•	NT 46036 57542	Sc3 *dun* or G3 ***dùn*** + SSE1 *law*
Dun Law{	CHK	•R•	NT 46036 57542	Sc3 *dun* or G3 *dùn* + SSE1 ***law***

4.2.1.4 Hill-term Variation

Place-names referring to the same topographical feature, having one or more historical substitutions of hill-term, are also accorded separate table rows to ensure each is triaged.

The relationship of Hallydown CHM and Hallydown Hill CHM (see Fig. 8.1) is surprisingly complex. The favoured scenario is that *Helideneshou* •R• (*ND* no. 269) is named from **Hālig denu* •R• (> Hallydown Dean NT 92218 65285), but the hill has been subsequently renamed Hallydown Hill <> Hallydown •S• < **Hālig dūn*. This implies at least two separate naming events are responsible for the range of historical forms known for this group of related and derivative names (another is *Halidunestele ND* 295; *Heli-*, *ND* 269. '?a shore-fishing site') <> **Hālig dūn* •S• and •R•. It also accounts for the renaming of Hallydown Dean •R• <> Hallydown •S•, which is an earlier original coining. Although the elements OE *hōh*, ESc *huch*, and SSE *hill* may refer to the same relief-feature, Hallydown CHM •S• NT 92418 64628 itself could be named from a different hill (*dūn / doun*) – the one beneath the settlement – or from the nearby ravine (*denu / dene*). Categorising these alternatives in the following way permits every scenario to be explored:

Place-name	*Par.*	*Class.*	*NGR*	*Etymology*
Hallydown Hill{	CHM	•R•	NT 92091 64510	Sc2 *haly* or OE3 *hālig* + Sc2 ***doun*** or Sc1 *dene* or OE3 *dūn* or OE1 *denu* + SSE1 *hill*
Hallydown Hill{	CHM	•R•	NT 92091 64510	Sc2 *haly* or OE3 *hālig* + Sc2 *doun* or Sc1 *dene* or OE3 ***dūn*** or OE1 *denu* + SSE1 *hill*
Hallydown Hill{	CHM	•R•	NT 92091 64510	Sc2 *haly* or OE3 *hālig* + Sc2 *doun* or Sc1 *dene* or OE3 *dūn* or OE1 *denu* + SSE1 ***hill***
Helideneshou{ (?> Hallydown Hill{)	CHM	•R•	*NT 92091 64510	Sc2 *haly* or OE3 *hālig* + Sc2 *doun* or Sc1 *dene* or OE3 *dūn* or OE1 *denu* + ESc1 ***huch*** or OE1 *hōh*[1]
Helideneshou{ (?> Hallydown Hill{)	CHM	•R•	*NT 92091 64510	Sc2 *haly* or OE3 *hālig* + Sc2 *doun*[1] or Sc1 *dene* or OE3 *dūn* or OE1 *denu* + ESc1 *huch* or OE1 ***hōh***[1]
Hallydown{	CHM	•S•	NT 92418 64628	

In the next example, the toponym has apparently undergone hill-term variation between $_{\text{Sc1}}$ *side* and $_{\text{Sc1}}$ *bank*, and acquired an epexegetic:

Place-name	Par.	Class.	NGR	Etymology
Greenbank	CBP	•S•	NT 81041 69204	$_{\text{Sc1}}$ *green* + $_{\text{Sc1}}$ ***bank***
Greenside Hill$_{\{}$	CBP	•R•	NT 80876 68856	$_{\text{Sc1}}$ *green* + $_{\text{Sc1}}$ ***side*** + $_{\text{SSE1}}$ *hill*
Greenside Hill$_{\{}$	CBP	•R•	NT 80876 68856	$_{\text{Sc1}}$ *green* + $_{\text{Sc1}}$ *side* + $_{\text{SSE1}}$ ***hill***

An alternative interpretation of these names is that *Greenbank* •S• was situated on an unattested **Green Bank* •R•. Had Greenside Hill not been recorded, then **Green Bank* •R• would have been inferred (§4.2.3), and an originally separate **Green Side* •R• would be treated as having attracted the epexegetic $_{\text{SSE}}$ *hill*. That could indeed be the correct sequence of development, but a lack of early forms, or a feasible location for the hypothetical *bank*, would result in an inadmissible triage score of <2.0. Thus, inferring **Green Bank* •R• to eliminate it again in Stage 5 would be a fruitless exercise. Instead, as *Greenbank* •S• and Greenside Hill •R• are actually documented, and since they stand only 387 m apart, they will be treated as hill-term variation. It is possible that exploring diachronic substitution of this kind might also reveal if a degree of arbitrariness has operated in the selection of hill-terms, or indeed if there has been a loss of precision in their deployment, as suspected by Gelling and Cole (*LPN*, xiii), but partially refuted by Nurminen (*HPND*, 271).

4.2.1.5 Renamed Places and Obsolete Toponyms

If a relief-feature has had more than one complete name over time, rather than evolving, from the variation of a particular element (as in the previous section), then individual rows are created to permit the separate analysis of each:

Place-name	Par.	Class.	NGR	Etymology
St. Abb's Head$_{\{}$	CHM	•R•	NT 78590 38809	$_{\text{en1}}$ *St. Abb's* + $_{\text{Sc1}}$ ***heid***
Coldeburcheshevet$_{\{}$	CHM	•R•	NT 78590 38809	$_{\text{en2}}$ *Colud* or $_{\text{Br2}}$ **Colud* + $_{\text{OE1}}$ *burh* + $_{\text{OE1}}$ ***hēafod***

4.2.1.6 Existing Names

Existing name ($_{en}$) is the etymological label adopted by SSPN for an element that has functioned elsewhere as a name in its own right (*PNFIF1*, 10) or is presumed to have done so. Two main types may be distinguished: derivatives and transferred names.

Topographical settlement-names occasionally inspire derivative naming in the immediate locality. Whitsome Laws WHI •S• NT 83578 50831, located near two adjacent hills, The Laws$_1$ WHI •R• NT 83139 50774 and The Laws$_2$ WHI •R• NT 83337 50784, illustrate this phenomenon. The hill-term, *law*, divorced from its primary sense, has inspired a clutch of derivatives. In this case the primary settlement, Whitsome WHI •S• NT 86038 5048, still exists.[120] Despite the fact the seven place-names in Table 4.5 contain *law*, they are excluded at Stage 1 because their referent is Whitsome Laws •S•, rather than The Laws$_{1\ \&\ 2}$ •R•.

Place-name	***Par.***	***Class.***	***NGR***
Whitsome Laws	WHI	•S•	NT 83578 50831
Laws House (The Laws)	WHI	•S•	NT 83063 50678
South Laws (House)	WHI	•S•	NT 83392 49460
Laws Cottage	WHI	•S•	NT 83256 49448
Laws Moor Plantation	WHI	•V•	NT 83854 49021
**Laws Moor*	WHI	•R•	[unlocated]
Laws North Plantation	WHI	•V•	NT 83737 49499

Table 4.5. Derivatives of Whitsome Laws WHI •R•.

Although rejected for the purpose of comparing hill-terms and landscape, the usefulness of derivatives is illustrated by this cluster of Whitsome names. Had Laws Moor Plantation •V• not survived, the existence of a former **Laws Moor* •R• might have passed unremarked. This demonstrates that derivative names can sometimes serve as the only memorial to

[120] The nearby Whitsomehill WHI •S• NT 86339 49465 is a further derivative, this time from an unrecorded **Whitsome Hill*, which when inferred (§4.2.3) would stand in the same co-appellative relationship to Whitsome •S• as Whitsome Laws •R•.

former or otherwise undocumented settlement- or relief-names.[121] If *LPN* Chapter 2 'Marsh, Moor and Floodplain' were the subject of the current investigation, then **Laws Moor* would have been recovered and assigned a separate row in the triage table.

A further example is Whalplaw Burn LAU •W• NT 52839 53746. Neither *Whalplaw* •S• nor Whalp Law •R• have *REELS* head-names, but these co-appellatives, retrieved from historical sources, would merit further investigation given their potential ∑=3.0. In the *Appendices*, derivatives are flagged with a lower-case delta (δ) followed by the place-name from which they are derived, e.g. East Gordon appears as δ Gordon GOR •S•.

Transferred-names differ slightly from derivatives in that they are not a recycled element in a new coining but a complete renaming after another place, generally located at some distance. This can arise from cultural, memorial, tenurial, political, personal, or even religious motivations (*PNFIF1*, 11). Examples from Berwickshire include: Bermuda LAU, Sebastopol LAU, Trasnagh CSM, and most probably Houndslow WRR (Table 4.6). The last is analysed in *REELS* as $_{\text{en2}}$ *Hounslow* or $_{\text{SSE3}}$ *hound* + $_{\text{SSE2}}$ *law*, which illustrates well the reason for initially over-including names that appear to contain a hill-term. Although Houndslow might have been an original coining in *law*, further investigation reveals a first attestation in 1793 for a new village built in 1775 (*OSA*, vii, 110). These facts, together with the absence of any suitable hill in the vicinity that may have inspired its name, point strongly to a transferred name. Had Houndslow WRR been triaged it would have appeared:

Element	***Place-name***	***Etymology***	***Terrain***	***Sources***	∑	***Testability***
$_{\text{SSE}}$ *law*	Houndslow WRR	0.5	0.0	0.0	0.5	*inadmissible*

Table 4.6. Toponymic triage of Houndslow WRR.

[121] See the discussion of *Schitenhogesbelle* CHM (§4.4.2), which illustrates how a derivative can sometimes help bridge gaps in the linguistic continuum: $_{\text{ESc}}$ *bell*, in this instance.

So, on the strength of available evidence, even if Houndslow WRR were a genuine early coining, the ∑=0.5 warns it cannot support a reliable evaluation of the element SSE *law*.[122] In terms of the methodology, if an original settlement and/or relief-feature *can* be located, then the label *existing name* may have been misattributed and the toponym should be re-etymologized. Otherwise, existing names are returned to REELS2, since they lack a direct relationship to a definite landscape feature, which testing the GCH requires.[123]

Implementation of triage Stage 1 (§4.2.1.1–§4.2.1.6) divided 1,722 *REELS* head-names into REELS1 (provisional), consisting of 700 head-names across 759 spreadsheet-rows, and REELS2 (provisional), consisting of 1,022 head-names/rows. The identification and return of derivatives (113 head-names/rows) and transferred-names (5 head-names/rows) from REELS1 amended these tallies to: 582 head-names and 641 rows (REELS1 provisional), and 1,140 head-names/rows (REELS2 provisional). A sixth column, headed *Returned from REELS1*, was added to REELS2 to record the reasoning these 118 head-names were eliminated (see *Appendix B*).

4.2.2 Stage 2 – Element Sense Definitions

If a putative hill-term does not function with reference to the topography in the senses described in *PNL* and *LPN* then it cannot be used to test the GCH. The purpose of this section is to identify and reject place-names in REELS1 with non-hill-term senses and return them to REELS2. To do this, sense-definitions are collated from dictionaries, element vocabularies, and relevant articles to create Table 4.7. This resource is fundamental to the

[122] To recapitulate, this ∑=0.5 was reckoned by tallying *Etymology* of 0.5 (a translation of *REELS* certainty level 2 for SSE *law*), plus *Terrain* of 0.0 (no obvious single relief-feature can be identified), plus *Sources* of 0.0 (the earliest attestation in a source >1700).
[123] See §4.2.3.5 for further discussion of the unsuitability of derivatives and transferred-names to test the GCH.

entire thesis. It groups together descriptors for each hill-term by a sense number. The etymologies and historical forms of REELS1 names were reviewed and a sense definition from Table 4.7 determined for each. Somewhat in anticipation of the next section, a parallel process was undertaken to identify and pair relief-features and settlements according to their appearance, situation, and known historical evolution. The most apt sense number was suffixed to the hill-term as a superscript, e.g. the *dūn* of Earlston EAR appears as sense 1:

Place-name	*Par.*	*Class.*	*NGR*	*Etymology*
Earlston	EAR	•S•	*NT 57217 38241	$_{\text{pn2}}$ *Arkil* + $_{\text{OE1}}$ ***dūn***^{1}

With minor adjustments to harmonise style, the definitions of Table 4.7 are based closely on the sources cited rather than being exact quotations. They encompass the range of reference for hill-terms found in Berwickshire place-names; other non-topographical connotations are largely omitted except where directly pertinent. The elements are arranged alphabetically. The cross-referencing of cognates (≈) broadly signals the evolution of hill-terms, and this includes the historical linguistic continuum of Scots in its interaction with other languages (§1.4.2.1).

The sections of Table 4.7, labelled *admissible* and *inadmissible*, distinguish hill-term definitions from other senses. The last exhibit a multiplicity of applications, including: generics expressive of spatial relationships (e.g. $_{\text{Sc}}$ *heid*^{2} – the highest part of something); undefined areas rather than precise localities (e.g. $_{\text{Sc}}$ *brae*^{4} – an upland mountainous district); or references to human exploitation of the landscape (e.g. $_{\text{Sc}}$ *bank*^{5} – the place in a peat moss where peats are cut); and so forth. Any definition that could reasonably belong to either division is prefixed '~' instead of '–' but only grouped with *inadmissible* senses. Therefore, *admissible* senses unambiguously characterize hill-shape and may legitimately test the GCH. Whether every researcher would agree the same attribution of senses to these divisions is less important than the fact all toponyms have been measured against a standardized set of definitions.

To pursue the principle of comparing like-for-like, the categorization of hill-elements will mirror the chapter groupings of *LPN*. Thus, an element such as $_{\text{OE}}$ *mōr* (*LPN*, 44; 58–60), which has both hill-term and non-hill-term senses, is excluded from testing hill-shape for much the same reason non-hill-term senses are excluded. Coincidentally, $_{\text{OE}}$ *mōr* has one connotation, which corresponds exactly to another *inadmissible* hill-term, $_{\text{Sc}}$ *brae*[4]:

> *mōr* is used most frequently as the first element of compound place-names…[but there exists] a relatively small category in which *mōr* is the generic, and some of these (Dartmoor DEV and Exmoor DEV/SOM, Dunsmore WAR, Otmoor OXF, Sedgemoor SOM, Snelsmore BRK, Stainmore YOW/WML, Weald Moors SHR) are district-names which were not used for any individual settlement.
>
> (*LPN*, 59)

Lammermuir ($_{\text{OE1}}$ *lamb* + $_{\text{OE1}}$ *mōr*) would be a Berwickshire contribution to the above list.

Toponyms with admissible sense-definitions are retained in REELS1 while those having inadmissible senses are returned to REELS2.

With the completion of Stage 2, 84 REELS1 head-names (95 spreadsheet-rows) were found to have sense-definitions that could not contribute to testing the GCH, both those having non-hill-term connotations and where a definite hill-term sense cannot be asserted with enough confidence. These are returned to REELS2 and flagged as 'non-hill-term'. This brings the tally of REELS1 head-names to 498 (546 rows) and for REELS2 to 1,224 head-names (1,235 rows). The historical forms and analysis underpinning all but a handful of REELS2 head-names are publicly accessible via *BWKR*. Although not the central focus of the current study these data were reviewed in the compilation of the datasets.

Table 4.7. Berwickshire place-names elements: topographical sense definitions *admissible* or *inadmissible* for testing the GCH, is as follows:

	Sc **bank** < ESc *bank*, *banc* < ME *bank*(*e*), *bonk* < ODan **banke*, ≈ OWN *bakki*.
Admissible	1 – hillside: a slope *la15-* (*CSD2* BANK[2] *n*.[1]). – a slope or bank (*PNFIF5*, 291). – a raised shelf or ridge of ground; a long, high mound with steeply sloping sides; one side or slope of such a ridge or mound *la12-* (*OED3* BANK[1] *n.*[1]). – the slope of a hill, a hillside *la14-* (*OED3* BANK[3a] *n.*[1]). – the sloping side of a mound or hill *la16-* (*OED3* BANK[3b] *n.*[1], and *OED3* BANKSIDE[2] *n.*).
Inadmissible	2 ~ a bank (of a river, etc.) *la14*. Attributive with *croft*, *fauld*, *riggin*. Also, *Bankhede* 1519, *Bankend* 1546 (*DOST* BANK[1] *n.*). *cf. Bankhead* DRB 1472 (*VEPN* *BANKE). ~ the (sloping) ground bordering a river or loch *la14-* (*CSD2* BANK[1] *n.*[1]). ~ the edge of a river; the area of land immediately adjacent to a river; a riverbank. Formerly the shore of a lake or sea *16-* (*OED3* BANKSIDE[1] *n.*). 3 ~ pl. sea cliffs, a steep cliff; steep rocks; the seashore *la19-* Sh (*CSD2* BANK[6] *n*[1].). ~ the seacoast or shore. Also pl. *la14-la18* Ork Sh. *cf.* SEA-BANK[1a] *n*. (*OED3* BANK[10] *n.*[1]). 4 – the boundary-line of a farm *19-* (*CSD2* BANK[3] *n*[1].). 5 – the place in a peat moss where peats are cut *la19-* (*CSD2* BANK[4] *n*[1].). 6 – a raised footpath; a raised ridge of ground *20-* (*CSD2* BANK[5] *n*[1].). – an artificial embankment, as one surrounding or bordering a well, road, etc.; a military earthwork; a dyke providing protection from flooding or from the sea *la14* (*OED3* BANK[2] *n.*[1]). 7 – a sandbank (*DOST* BANK[1] *n*.). – mud- or sandbank (*PNFIF5*, 292). – a ridge or raised shelf of sand or other soft material on a seabed or riverbed, typically rising above or lying just below the surface; a large, elevated region of the sea-bed *la15* (*OED3* BANK[4a] *n.*[1]).

	SSE **bank** ≈ Sc *bank*.
Admissible	1 – a mound or ridge (*CCD* BANK[1] *n*.).[124] – an acclivity (*CCD* BANK[1] *n*.).

[124] There is no standard reference work of Scottish Standard English. However, the Chambers Concise Dictionary (CCD) definitions are included here as that source takes particular care to highlight English language usage in Scotland.

Inadmissible

2 ~ the margin of a river or lake, etc. (*CCD* BANK[1] *n*.).
3 – a shoal or shallow (*CCD* BANK[1] *n*.).

ESc ***bell*** < OE *belle*. ≈ ON *bjalli*.
Sc ***bell***

Admissible

1 – a bell; places containing this element probably refer to the shape of the feature so named (*PNFIF5*, 295).
– (as a generic) bell-shaped hill or knoll. *Cf.* Yeavering Bell NTB; Kimble BUC; Belchalwell DOR (*VEPN* *BELLE).
2 – the highest part of the slope of a hill. *The bell of the brae* the highest part of the of a hill *18-* (*CSD2* BELL *n*.[1.1]).
– to swell out, to bulge *e19* (*CSD2* BELL[3] *n*.[1.2]).

Inadmissible

3 – probable use to denote land and custom-dues applied to the upkeep of a bell (*DOST* BELL, BEL[1.3] n.[1]).

[*OED* and *DOST* have no reference to a hill-term sense. See §4.4.2, *Schitenhogesbelle*].

SSE ***bell*** ≈ Sc *bell*.

Admissible

1 – a rounded, bell-shaped hill [ME and ModE]. OE *belle* may have been used of hills, and hill-names in *bell* are common in the Borders (*LDPN*, 389).

Inadmissible

2 ~ anything bell-shaped (*CCD* BELL[1] *n*.).
3 – an instrument for giving a ringing sound bell (*CCD* BELL[1] *n*.).

Br ****blajn, *blejn*** < Brit **blakno-* > PrW *blain* > W *blaen*. > Corn *blyn*.

Admissible

1 – a summit (*BLITON* 2, 28–30, **blajn*, **blejn*).
– a summit (*VEPN* *BLAKNO-).

2 – a point, end, top (*LPN*, 152, s.v. *blain*, *blaen*).
– a point, end, top (*EPNE* BLAEN).
– a point (*VEPN* *BLAKNO-).

Inadmissible

3 – uplands (*BLITON* 2, 28–30).
4 – a head of a valley (*BLITON* 2, 28–30).
5 – the remotest region; limits; ?boundary; an extremity (*BLITON* 2, 28–30).
6 – a source; the upper reaches of a stream (*BLITON* 2, 28–30).

Sc **brae** < MSc *bra* < ESc *bra*, ≈ OE *brǣw* / *brēaw*. ≈ SSE *brae*.

Admissible

1 – a bank or stretch of ground rising fairly steeply; a hillside *la14-* (*CSD2* BRAE^{2} *n*.).
2 – the brow of a hill *la19-* (*CSD2* BRAE^{5} *n*.). See Sc *bell*^{2}.
– a brow, the edge of a hill (*VEPN* *BRÚN). *Cf. bareheid*, *braehead* – the top of a hill or slope *16-* ; and *brae foot* – the bottom of a hill or slope *la18-* (*CSD2* BRAE *n*.).

Inadmissible

3 – the (steep or sloping) bank of a river, lake, or seashore *13-* (*CSD2* BRAE *n*.).
– the steep bank bounding a river valley *14- OED2* BRAE^{1} *n*.).
4 – pl. an upland mountainous district: e.g. *Braes of Balquhidder la15-* (*CSD2* BRAE^{3} *n*.).
– pl. slopes, sloping upland (*PNFIF5*, 306).
5 – (the site of) a salmon trap consisting of an artificial gravel-and-stone bank across a river *18- NE* (*CSD2* BRAE^{6} *n*.).

SSE **brae** ≈ Sc *brae*.

Admissible

1 – a hill-slope (*CCD* BRAE *n*.).

Inadmissible

2 ~ the slope bounding a riverside plain (*CCD* BRAE *n*.).
3 – a road with a steep gradient; frequently in street names *19-*(*CSD2* BRAE^{4} *n*.).
– a (steep) slope, in sg. usually applied to a slope on a road (*PNFIF5*, 306).

PrW/PrCorn/PrCumb ***bre[ɣ]*** < Brit *brigā*. ≈ OE *berg*.

Admissible

1 – a high place, hill (*BLITON* 2, 33–35).
– a hill (*LPN*, 152, s.v. *breȝ*).
– a hill, mount (*CPNS*, 369).
– a hill (*LHEB,* 455, s.v. **breȝ*).
– a hill (*EPNE* *BRIGĀ).
– a hill (*VEPN* *BRIGĀ).

PrW ***brig*** < Brit **brico.*

Admissible

1 – top (*LPN*, 152, s.v. *brig*).
– top, a hill-top (*VEPN *brīko-*).

Br ****brïnn*** / Br ****bron[n]*** ≈ Br **brun* < Brit *brunnā.* ≈ PrW *brïnn* > W *bryn.* ≈ W *bron.*

Admissible

1 – a hill (*BLITON* 2, 37–38).
– a breast > rounded, swelling hillsides (*BLITON* 2, 41).
– a hill (*LPN*, 153, s.v. BRINN, BRYN).
– (Corn) a breast, round hill, hill (*EPNE* BRON): e.g. Trabrown CNW.
– a hill (*VEPN* *BRUNNJO–).

Br ****brun*** ≈ Br **brïnn, *bron[n].* ≈ W *bryn.*

Admissible

1 – a hill (*PNFIF5*, 309).
– a hill (*CPNS*, 226, 359, s.v. BRYN).
– a hill (*VEPN* *BRUNNJO–).

OE ***bune*** ≈ Sc *bun.*

Admissible

1 – a hill resembling a small cask or drinking vessel; a transferred sense of BUNE[2].
– a drinking vessel of some kind (*DOE* BUNE *n.*[1]).
– a drinking vessel, pitcher (*VEPN* *BUNE).

Inadmissible

2 – a small cask *la16* (*DOST* BUN[2] *n.* Also, BUNN, BWNNE), *cf.* BOYN(E) – a shallow tub *la17-* (*DOST*); BOYNE – a flat broad-bottomed vessel, into which milk is emptied from the pail *19-* (*DSL n.*[1]); a tub, esp. a washing-tub *la19* (*DSL n.*[2]); anything of a rounded shape, e.g. a halo *18-* (*DSL n.*[3]).

Sc ***cairn*** < G *càrn.*

Admissible

1 – a stony hill *18-* (*DSL* CAIRN[1.3] *n.*).
– a high, rocky hill (*CPNS*, 19, 234).
– a small hill, a stony hill (*PNFIF5*, 318).

Inadmissible	2	– a heap of stones (*CPNS*, 234). – a loose heap of stones: rubble *la16-* (*CSD2* CAIRN^{3} *n*.$^{1.1}$). – a cairn, a heap of rocks (*PNFIF5*, 318). – a pile of stones used as a boundary-marker; a mound of stones placed as a way-marker (on a mountain) *la14-* (*CSD2* CAIRN^{1} *n*.$^{1.1}$). – heaped stones marking a grave; a memorial *16-* (*CSD2* CAIRN^{2} *n*.$^{1.1}$).

		SSE ***cairn*** ≈ Sc *cairn.*
Inadmissible	1	– a heap of stones, esp. one raised over a grave, or as a landmark on a mountain-top or path (*CCD* CAIRN *n*.). – a pyramid of rough stones, raised as: a memorial of some event, or a sepulchral monument *16-* (*OED2* CAIRN^{1a} *n*.); a mere pile of stones *la17* (*OED2* CAIRN^{1c} *n*.); a boundary-mark, a landmark on a mountain top or some prominent point *18-* (*OED2* CAIRN^{1b} *n*.).

		Sc ***clint*** ≈ OE **clenc*, OE **clent*, ≈ ON *klint*.
Admissible	1	– a cliff, a crag, or a precipice *16-19*, *20- NE SW Bor* (*CSD2* CLINT^{1} *n*.$^{1.1}$). – a cliff, crag, precipice *16-* latterly and chiefly *SW Bor* (*PNFIF5*, 334). – a hard bare eroded rock-surface, specifically one developed in limestone regions in the north-west Pennines (*OED2* CLINT^{1} *n*.). – a ?hill (*VEPN* *CLENC); a ?rock, hill (*VEPN* *CLENT).
Inadmissible	2	– a cleft or crevice (in rocks) *la18-19*, *20- SW* (*CSD2* CLINT^{3} *n*.$^{1.1}$). – a crevice (*EPNE* CLINC). – a crack or slit in rock, a *grike* (*OED2* CLINT^{1} *n*.).
	3	– a rock, a stone *19- SW Bor Uls* (*CSD2* CLINT^{2} *n*.$^{1.1}$). – a hard or flinty rock, any pretty large stone, of a hard kind (*PNFIF5*, 334). – a hard or flinty rock; a hard rock projecting on the side of a hill or river, or in the bed of a stream; a part of a crag standing out between crevices or fissures *15-* (*OED2* CLINT^{1} *n*.).

OE ***clif*** ≈ ON *klif*.
ESc ****clif***

Admissible

1 – a river-bank (*PNL*, 130)
– settlements by water, streams and rivers both large and small (*LPN*, 153)
– the bank of a river (*DEPN*, 112)
– a low river-bank (*DOE* CLIF[4] *n*.).
– the steep bank of a river (*EPNE* CLIF).
– land by a body of water, bank, shore (*DOE* CLIF[2b] *n*.).
– the edge of the land next to a […] lake *OED3* **CLIFF** [2] *n*[1].).
– a cliff by [a] body of water (*DOE* CLIF[2a] *n*.).

2 – steep escarpments (*PNL*, 130); well-marked in their own locality; when viewed from above ... irregular – curved or indented and possibly quite short; more often inland or scarp slopes (*LPN*, 153).
– a steep slope or hillside (*OED3* CLIFF[3a] *n*[1].).
– the steep slope of a hillside, an escarpment (*EPNE* CLIF).

3 – small hills or bluffs (*PNL*, 130; *LPN*, 153).
– a small hill or bluff (*DOE* CLIF[4] *n*.).
– a bluff, headland (*DOE* CLIF[2a] *n*.).
– a slope (not necessarily a steep one) (*DEPN*, 112).

[*DOST* has no entry for ESc **clif*, for which OE *clif* senses are substituted here. The *VEPN* definition is omitted, for which §4.3, *Wyrmsclif*.].

Inadmissible

4 – cliff, rock, steep descent, promontory (*DEPN*, 112)
– a steep rock, a rocky precipice (*EPNE* CLIF).
– a high and very steep rock face, typically having exposed strata (*OED3* CLIFF [1a] *n*[1].).
– a cliff (*DOST* CLIFF *n*[1].).
– a cliff (*DOE* CLIF[4] *n*.).

5 – occasionally *clif* is used of steep sea cliffs (*LPN*, 153)
– the edge of the land next to a sea […]; a shore, coast, strand (*OED3* **CLIFF** [2] *n*[1].).
– a cliff by the sea (*DOE* CLIF[2a] *n*.).
– a high steep rock face on a seashore *OED3* **CLIFF** [1b] *n*[1].).
– a steep rock, a rocky precipice, esp. on the sea-shore (*EPNE* CLIF).

Sc ***craig, crag*** < ESc *crag* < G *creag*.

Admissible

1 – a cliff; frequently in place-names *la13–* (*CSD2* CRAIG[1] *n*.[1]).

Inadmissible

2 – a steep rock *la13–* (*CSD2* CRAIG[1] *n.*[1]).
– a rock (*PNFIF5*, 342).
3 – a projecting spur of rock *la18–* (*CSD2* CRAIG[2] *n.*[1]).
4 – pl. rocky ground *18–19, 20– NE EC* (*CSD2* CRAIG[3] *n.*[1]).

SSE **craig, crag** ≈ Sc *craig.*

Admissible

1 – a cliff (*CCD* CRAG *n.*).

Inadmissible

2 – a rough steep rock or point (*CCD* CRAG *n.*).
– a steep or precipitous rugged rock *la14–* (*OED2* CRAG[1a] *n.*[1]).
– a detached or projecting rough piece of rock *la14–* (*OED2* CRAG[2a] *n.*[1]).

Br **dīnas** ≈ G *dùn.* ≈ P **dun.* ?≈ OE *dūn.*

Admissible

1 – a hill *10–11*. Often a simplex name, or one qualified by a separate word, restricted to hill- and stream-names in Galloway, the Borders and Lothian, a distribution suggesting that it was only used during the period of Cumbric expansion into these areas, the tenth and eleventh centuries. (*BLITON* 2, 108, s.v. *DĪN).
– a hill (*EPNE* DIN, *DUNO–).

Inadmissible

2 – a camp of refuge, vs. *caer* – a permanently inhabited stronghold (*CPNS*, 372).
– a fort, refuge, stronghold *10–11* (*BLITON* 2, 111).
– a fort (*EPNE* DIN, *DUNO–).
– a defensive enclosure or place of refuge (*BLITON* 2, 108, s.v. *DĪN).

Sc **dod, dodd** ≈ ME *dodden.* ≈ dialE *dod.*

Admissible

1 – a bare hill with a rounded top *la12–* (*CSD2* DOD *n.*[4]).
– (*dialE*) the rounded summit of a hill, rare *<19* (*EPNE* DODDE).
– (*dialE*) a rounded summit or eminence *19–* (*OED2* DOD(D) *n.*[3]).
2 – a (rounded) lump or shoulder on a larger hill *la12–* (*CSD2* DOD *n.*[4]).
– (*dialE*) a lower summit or distinct shoulder or boss of a hill *19–* (*OED2* DOD(D) *n.*[3]).

Sc **doun** < ESc *doun* < OE *dūn*.

Admissible

1 – a hill (only in poetry and coupled with dale) (*DOST* DOUN[1] *n.*).
– a hill, [*pace DOST*] it may appear in place-names (*PNFIF5*, 356).

G **druim** > Sc *drum*.

Admissible

1 – the ridge of a hill (*Dwelly*).

Inadmissible

2 – a surface (*Dwelly*).

Sc **drum** < G *druim*.

Admissible

1 – a long narrow ridge or knoll; frequently in place-names *18–* (*CSD2* DRUM[1] *n.*[3]); *drumeheid* – the head of a ridge *e17* (*CSD2* DRUM *n.*[3], s.v.).
– a smooth elongated hill or ridge *18–* (*OED2* DRUM *n.*[2]).

Inadmissible

2 ~ pl. an area of ridged land intersected by marshy hollows *19–* SW (*CSD2* DRUM[2] *n.*[3]).

G **dùn** ≈ Br **dīn(as)*. ≈ P **dun*. ?≈ OE *dūn*.

Admissible

1 – a hill, hillock, mound (*Dwelly*).
2 – a (fortified) hill, defensive hill (*PNFIF5*, 358).
– a fortified eminence *la17–* (*CSD2* DUN *n.*).

Inadmissible

2 – a fortified house, fortress, castle, fastness, tower (*Dwelly*).
– a fortification (*PNFIF5*, 358).
– an iron-age stone-walled defensive homestead (*CSD2* DUN *n.*).

OE **dūn** ?≈ Br *dīn(as). ?≈ G dùn. ?≈ P *dun.
ESc **doun** > Sc doun.

Admissible

1 – a hill (*EPNE* DŪN).
– a hill, upland expanse (*LPN*, 164–173). *LPN* redefines *dūn* as: i) 'consistently used in settlement-names for a low hill with a fairly level and fairly extensive summit which provided a good settlement-site in open country'; ii) 'larger massifs with settlements at the foot of them'; and iii) 'an uninhabited hill adjacent to a settlement'.
– a hill, a mountain *OE–15* (*DOE* DŪN^{1} *n*.; *OED3* DOWN^{1} *n*.^{1}).

Inadmissible

2 ~ (ME *doun*) an expanse of open hill-country (*EPNE* DŪN).
– pl. (chiefly) an elevated stretch of open, uncultivated land with gently rolling hills; spec. (usually as *the Downs*) undulating chalk and limestone uplands in southern and south-eastern England, with few trees and used mainly for pasture. *e14–* (*OED3* DOWN^{2} *n*^{1}.).
3 – a sand dune *e16–e20* (*OED3* DOWN^{4} *n*.^{1}).

Sc **edge** ESc ege < OE ecg.

Admissible

1 – the crest of a ridge *la15* (*CSD2* EDGE^{2} *n*.$^{1.1}$).
– (ESc *ege*) an edge, the crest of a sharp ridge (*PNFIF5*, 364).
– (ME) an edge, the sharp edge at the top of a hill, esp. an escarpment *14–* (*EPNE* ECG).
– the crest of a sharply pointed ridge; escarpments terminating a plateau; 'in Scottish *edge* usually denotes merely a ridge, watershed' *15– 16* (*OED2* EDGE^{6a} *n*.).
– the brink or verge of a bank or precipice *15–19* (*OED2* EDGE^{11a} *n*.).

Inadmissible

2 ~ the boundary of a surface, a border, a verge; an end or extremity; edging *16–* (*CSD2* EDGE^{3} *n*.$^{1.1}$)
~ a border, verge; (by extension) that portion of the surface of any object, or of a country, district, etc., adjacent to its boundary *15–19* (*OED2* EDGE^{10a} *n*.).

SSE **edge** ≈ Sc edge.

Admissible

1 – a ridge or crest (*CCD* EDGE *n*.).

OE ***hēafod*** > SSE *head.*
ESc ***heved*** > Sc *heid.*

Admissible

1 – a head, a projecting piece of ground (*DOE* HĒAFOD[9a] *n*.).
– 'projecting piece of land' is the only sense observed in ancient settlement-names. It probably did not mean 'peak' or 'summit' (*LPN*, 175; *PNL*, 159).
2 – a projecting piece of ground … not typically found in coastal areas, [nor does it] seem to refer to the highest part of a hill, but chiefly to hill-spurs and the like *11–, ?10–* (*OED3* HEAD[Intro.] *n.*[1]).
– a piece of land which juts out:
[i] below the level of the rest of a massif and [which] may be connected with the manner in which some animals, such as pigs and badgers, habitually carry their heads below the level of their shoulders [e.g. the appellative *swīneshēafod* 'pig's head', 'a projecting "snout" of land' (*PNL*, 160)]; or
[ii] which is frequented by that animal (*DOE* HĒAFOD[9ai] *n*., and *LPN*, 175), e.g. *heoroteshēafod* 'hart's headland' (*PNL*, 160). *Hēafod* is sometimes used of very low projections (*LPN*, 175).

Inadmissible

3 – the uppermost or furthermost portion of a valley, cave, inlet, etc., also that end of a lake or other body of water at which a river or stream enters it *eOE–* (*OED3* HEAD[37] *n.*[1]). Note: the appellative *dūnhēafod* 'hill end' (*LPN*, 175).
– upper end of a valley, marsh, dike, ditch, etc.; occasionally pl. used with sg. sense (*DOE* HĒAFOD[9b] *n*.).
– end, source … a sense fairly common in minor place-names *mid10* (*PNL*, 159).
4 – the source or headwaters of a river or stream *eOE–* (*OED3* HEAD[38a] *n.*[1]).
– the upper end of a watercourse, body of water; head, source of a stream, pool, creek, watercourse, spring; occasionally used in pl. with sg. sense (*DOE* HĒAFOD[9c] *n*.).
5 – strip of land at the end of a ploughed field *OE–16* (*OED3* HEAD[39a] *n.*[1]).
– a terminal or bounding portion of land; an edge, a boundary *OE–18* (*OED3* HEAD[39b] *n.*[1]).
– headland, strip of land left for turning the plough at the end of a ploughland (*DOE* HĒAFOD[9d] *n*.).
– headland in a field system (*PNL*, 159).
– the strips of land at the end of a ploughed field, left for convenience in turning the plough at the end of the furrows or near the border. In early use also: †a boundary formed by this *OE–* (*OED3* HEADLAND *n.*[1])
6 – the top or upper end of a road, street, etc. *16–, ?15–* (*OED3* HEAD[41] *n.*[1]).

Sc ***heid*** < ESc *heved* < OE *hēafod.* ≈ SSE *head.*
SSE ***head*** < OE *hēafod.* ≈ Sc *heid.*

Admissible

1 – a projecting piece of coastal land, esp. when of considerable height; a promontory, a headland, a cape. Also pl., the projecting pieces of land which enclose a bay *14–* (*OED3* HEAD[40a] *n.*[1]).
– a steep point of land projecting from a coastline into the sea or other expanse of water; a cape or promontory *la15–* (*OED3* HEADLAND *n.*[2]).
– a headland *la15–* (*CSD2* HEID[5] *n.*[1.1]).

[*CCD* has no reference to usage as a hill-term].

Inadmissible

2 ~ the top or summit of a hill or mountain *15–* (*OED3* HEAD[41] *n.*[1])
– the highest part or upper end of a river, valley, hill, or parish *la14* (*CSD2* HEID[3] *n.*[1.1]).
– the top, upper, or principal part or end of something (OED3 HEAD II *n.*[1]).
– a head, end, top. In late coinings, or names which appear late in the record (i.e. post 1800 or thereabouts) it is not always possible to distinguish between Sc *heid* and SSE *head* and today both will be heard depending on the language of the speaker (*PNFIF5*, 400).
3 – *head rig*, *heid rig*, *hedrig* – the grassland at the edge of a field; originally land left unploughed to allow for the turning of the plough *la15–* (*CSD2* HEID *n.*[1.1], s.v.).
– a strip of land at the end of a ploughed field which is left unploughed until after the main ploughing is complete, for convenience in turning the plough *la15–* (*OED3* HEADRIG *n.*).
4 – the top or upper end of a road, street, etc.; the part of a subsidiary road nearest the main road. Also: the upper or main end of a town; the outer part of a town leading towards a main road or highway. Originally Scottish. *15–* (*OED3* HEAD[42] *n.*[1]).

Sc ***heuch, heugh*** < ESc *huch* < OE *hōh.*
SSE ***heuch, heugh*** < ME *hōgh* < OE *hōh.*

Inadmissible

1 ~ a crag or precipice, a cliff or steep bank (overhanging a river or the sea); frequently in place-names *la11–.* Also, *heuch heid* – the top part of a cliff or precipice *16–19* (*CSD2* HEUCH[1] *n.*[1.1]).
~ a precipice, crag, cliff, a steep hill. In Fife [pace *LPN*] it applies simply to very steep or even vertical slopes (*PNFIF5*, 401).
2 – a ravine with steep, overhanging sides *la15–* (*CSD2* HEUCH[2] *n.*[1.1]).
– a glen or ravine with steep overhanging braes or sides; a cleuch *16–19* (*OED2* HEUGH[2] *n.*).
– (dialE) a steep glen, a deep cleft in rocks (*EPNE* HŌH).
3 – the shaft of a mine or pit; the steep face of a quarry *15–19, 20– C* (*CSD2* HEUCH[3] *n.*[1.1]).
– the steep face of a quarry or other excavation; an excavation for coal, originally open; a coal-pit; *figurative* a pit *la16–e19* (*OED2* HEUGH[3] *n.*).

Sc ***hill*** < OE *hyll.*

Admissible

1 – an elevation, a (low) mountain *la12–* (*CSD2* HILL[1] *n.*[1]).

Inadmissible

2 ~ a common moor where grazing rights are shared by the community *16–* (*CSD2* HILL[3] *n.*[1]).
3 ~ upland or moorland on a farm used as rough grazing *la19–* (*CSD2* HILL[4] *n.*[1]).
~ hill grazing, rough grazing; the hill grazing attached to a settlement called [farm name] (Barrow 1998, 65, 67).
~ a hill, upland grazing. Also, Sc / SSE *hillside*; and Sc *hil(l)toun* – a farm on a hill, a farm created to exploit upland grazing (*PNFIF5*, 401–404).
4 ~ community moorland where peats are cut; a peat moss *la17–19, 20– Sh Ork N NE* (*CSD2* HILL[5] *n.*[1]).
5 – a pile of earth; an artificial mound *16–* (*CSD2* HILL[2] *n.*[1]).
– a heap or mound of earth, sand, or other material raised or formed by human or other agency *la13–* (*OED2* HILL[3a] *n.*).
– (ME) a heap of earth, sand, or other material (*EPNE* HYLL).

SSE ***hill*** < OE *hyll.*

Admissible

1 – a hill (*PNFIF5*, 401).
– a high mass of land, less than a mountain (*CCD* HILL *n.*).
2 – a mound (*CCD* HILL *n.*).

Inadmissible

3 ~ upland grazing (*PNFIF5*, 401).
4 – an incline on a road (*CCD* HILL *n.*).

OE ***hlāw*** > ESc *law* > Sc *law.*

Admissible

1 – a natural mound, knoll, low rounded hill (resembling a tumulus) (*DOE* *HLǢW*, *HLĀW*[1b] *n.*).
– a hill, a conical hill resembling a tumulus (*EPNE* HLĀW).
– a natural hill, sometimes a mountain: the more likely sense north of a vague line from the Mersey to the Humber. Only a small proportion of *hlāw*, *hlǣw* compounds is contained in settlement-names (*LPN*, 178–180).

Inadmissible

2 – a burial mound, grave-mound, barrow, tumulus (*DOE* HLǢW, HLĀW[1a] *n*.).
– an artificial mound, a burial mound, a mound in which treasure is hidden (*EPNE* HLĀW).
– a tumulus: the more likely sense south of a vague line from the Mersey to the Humber (*LPN*, 178–180). [It is sometimes difficult to distinguish *hlāw*[1] from *hlāw*[2], although the sense 'artificial mound, tumulus' is esp. common in charters from the south of England and the English Midlands (*DOE* HLǢW, HLĀW[1c] *n*.)].

OE **hōh** > ESc *huch*; > ME *hōgh*.
ESc **huch** < OE *hōh*; > Sc *heuch* > SSE *heuch*, *heugh*.

Admissible

1 – a point of land formed like a heel, or boot, and stretching into the plain, perhaps even into the sea (*Kemble* iii, xxvi).
– a projecting ridge of land, a promontory; a height enduring abruptly or steeply *OE–18* (*OED2* HOE[1] *n.*[1]).
– ridges which rise to a point and have a concave end; the shape is in fact that of the foot of a person lying face down, with the highest point for the heel and the concavity for the instep (*LPN*, 186).
– a slight or a steep ridge; the end of a ridge where the ground begins to fall sharply (*EPNE* HŌH).
2 – a low projecting ridge of land in the bend of a river or in more level ground; (*EPNE* HŌH).
– a projecting ridge of land, promontory (*DOE* HŌH[2] *n*.).

Inadmissible

3 ~ a precipitous or hanging descent; a craggy or rugged steep (*sic*); a precipice, cliff, or scaur; most commonly, one overhanging a river or the sea *15–* (*OED2* HEUGH[1] *n*.). [Investigation of Sc *scaur* in Berwickshire confirms it to be the successor of this sense of *hōh*, which generally indicates the side of a hollow, so perceived, rather than a genuine hill-term. There appears to be no distinction between Sc *scaur* and the corresponding senses of Sc/SSE *heuch, heugh*].

OE **hyll** > Sc *hill*.

Admissible

1 – a hill; (in charter bounds) a hill, a natural eminence or elevated piece of ground (*DOE* HYLL *n*.).
– a natural elevation of the earth's surface rising more or less steeply above the level of the surrounding land. Formerly the general term, including what are now called mountains; after the introduction of the latter word, gradually restricted to heights of less elevation; but the discrimination is largely a matter of local usage, and of the more or less mountainous character of the district, heights which in one locality are called mountains being in another reckoned merely as hills. A more rounded and less rugged outline is also usually connoted by the name *laOE* (*OED2* HILL[1a] *n*.).
– a natural eminence of a more spiky outline than that to which *dūn* is applied (*LPN*, 169–171). A term preferred by Anglo-Saxons for hills which were neither smoothly rounded nor flat-topped (*LPN*, 161).
– a hill, a natural eminence or elevated piece of ground, from slight elevation in flat country to a lofty one in mountainous country. The term had a more general application in Old English than *beorg* or *dūn* (*EPNE* HYLL).

Sc **kame** < OE *camb.*

Admissible

1 – a long narrow steep-sided ridge, the crest of a hill or ridge; frequently in place-names *16-* (*CSD2* KAME[3] *n.*[1.1]).
– ridge, crest of a hill (late) (DOE CAMB[3] *n.*).
– used in various senses, esp. that of a steep and sharp hill ridge; hence in *Geology* one of the elongated mounds of post-glacial gravel, found at the lower end of the great valleys in Scotland and elsewhere throughout the world; an esker or osar *19–* (*OED2* KAME *n.* See COMB[6d] *n.*).
– 'comb, crest' is used topographically in p[lace] n[ame]s to mean 'hill-crest' or 'ridge' (*VEPN* *CAMB).

Inadmissible

2 – a small peninsula, a narrow isthmus *20– N* (*CSD2* KAME[5] *n.*[1.1]).

ESc **knoll** < OE *cnoll.*

See: Sc *knowe* / SSE *knowe*.

Sc **knock** < G *cnoc.* ≈ W *cnwc.* ≈ OE **cnocc*, ?≈ ON *knjúkr.*

Admissible

1 – a hill, a hillock; frequently in place-names *14–* (*CSD2* KNOCK *n.*[3]).
– a hill (*PNFIF5*, 416); a loanword from G *cnoc* 'hill, knowe', this usually refers to a small but pronounced hill (*PNFIF5*, 335).
– a hill; a hillock, a knoll *?18–* (*OED2* KNOCK[1] *n.*[2]).
– a hill, hillock (*VEPN* *CNOCC[2]).

Sc **knowe** < ESc *knoll* < OE *cnoll*; ≈ ON *hváll*, *hóll.*
SSE **knowe** ≈ Sc *knowe.*

Admissible

1 – a (small) rounded hill, a fairy hill; a hillock, a mound; frequently in place-names *13–*. Also, *know heid*, *knowe head* – a hilltop *la16–* (*CSD2* KNOWE *n.* s.v.).
– (Sc and SSE) a knoll, a small rounded hill (*PNFIF5*, 417).
– a mound, a hillock; an area of rising ground, a rise *16–* (*OED3* KNOWE *n.* = KNOLL *n.*[1] < OE *cnoll* 'hill-top, cop, summit, hillock'). Note also: a hill-top, the summit of a large hill, (later) a knoll, a hillock (*EPNE* CNOLL).

[*CCD* has no reference to SSE *knowe* as a hill-term].

Sc **law** < ESc law < OE *hlāw*.

Admissible

1 – an isolated or conspicuous rounded or conical hill; frequently in place-names *12–* (*CSD2* LAW[1] *n*.[2]).
– a hill, esp. one more or less round or conical. Sometimes with local designation prefixed, as *North Berwick Law*, *Cushat Law 15–19* (*OED2* LAW[1] *n*[3].).
– a hill, hillock. It can apply to relief features of very varying size, from some of the highest hills in Fife to small hillocks; some of these smaller *laws* are in fact burial mounds [LAW[2]]. The common denominator in its usage would appear to be that the feature it describes is conspicuous, rising relatively steeply from its surroundings, although not necessarily very large or very high in absolute terms (*PNFIF5*, 421).

Inadmissible

2 – an artificial mound or hillock; a grave-mound *la16–e19* (*CSD2* LAW[3] *n*.[2]).
– monumental tumulus of stones *17* (*OED2* LAW[2] *n.*[3]).
3 – a mound of earth and shingle on a riverbank to which salmon nets are brought ashore *la16–e19* (*CSD2* LAW[2] *n*.[2]).

SSE **law** < OE *hlāw*. ≈ Sc *law*.

Admissible

1 – a hill, esp. rounded or conical (*CCD* LAW[2] *n*.).

Sc **mount** < G *monadh* + ?OE influence.

Admissible

1 – a mountain *la14–* (*CSD2* MOUNT *n*.).
– originally a mountain, a high hill *eOE–* (*OED3* MOUNT[1] *n*.[1]).
2 – a more or less conical hill of moderate height rising from a plain; a hillock. Now chiefly poetic or in proper names of mountains or hills (*OED3* MOUNT[1] *n*.[1]).

Inadmissible

3 ~ a stretch of hilly or high ground; a mountain, a hill, a moor; *la12–17, 18–* (*CSD2* MONTH *n*.[2]).
~ high land, moorland *la16–e17* (*CSD2* MOUNT *n*.).
4 – (also SSE) a hill. It is used in a somewhat fanciful or pretentious way to refer to small hills or even mounds (*PNFIF5*, 447).

SSE **mount** ≈ Sc *mount*.

Admissible

1 – a mountain (*CCD* MOUNT[1] *n*.). See Sc *mount*[1].
2 – a small natural hill or mound (*CCD* MOUNT[1] *n*.).
– a low tree-covered hill *la19– C* (*CSD2* MOUNT *n*.).

Inadmissible

3 – (also Sc) a hill. It is used in a somewhat fanciful or pretentious way to refer to small hills or even mounds (*PNFIF5*, 447).
– a small artificial hill or mound (*CCD* MOUNT[1] *n*.).

OE ***nes, næss, *nesu, *neosu*** > ESc *nese*, *neis*. ≈ ON *nes*.

Admissible

1 – a promontory, headland, or cape *OE–* (*OED3* NESS *n*.[1]).
– the nose, hence, a headland, promontory, a projecting piece of land formed in the bend of a river (*EPNE* NĒS[1]. 'Löfvenberg … points out that the OE head-form should be **nesu*, **neosu*. *JEPNS* 1 (1969), 32).
– usually applied [in the Lake District] to land jutting into a lake (*LDPN*, 412).

ESc ***nese, neis*** < OE *nes*.
Sc ***nes, ness*** < ESc *nese*, *neis*.

Admissible

1 – a headland or promontory; frequently in place-names *la12–* (*CSD2* NESS *n*.).
– a headland, promontory (*PNFIF5*, 455).

Sc ***pike*** < OE *pīc*, *pēac*.
SSE ***pike*** < Sc; ME *pic*.

Admissible

1 – a sharp-pointed hill. Found in place-names in SLK, ROX and in northern England *18–* (*DSL* PIKE *n*.[5]).
– a sharp-pointed hill or summit (*CCD* PIKE *n*.).
– a pointed or peaked summit; a mountain or hill with a pointed summit; a peak *13–* (*OED3* PIKE[1a] *n*.[2]).

[*DOST* has no reference to topographic usage in Scots].

Inadmissible

2 – a beacon, pillar, or cairn built on the highest point of a mountain or hill. *rare 18–* (*OED3* PIKE[1b] *n*.[2]).
– a pointed pile of stones, a cairn (*DSL* PIKE *n*.[6]).
3 – a round hay-rick with a conical top in which hay is temporarily kept to dry, before being built into the larger stack. Also, in northern English dialect. (*DSL* PIKE *n*.[7]).
– a pointed or peaked stack, often conically shaped, in which hay is either stored or dried temporarily in the field before being stored *16–* (*OED3* PIKE[2] *n*.[2]).

SSE ***point***

Admissible

1 – a promontory or cape; the tip of a piece of land running out to sea. Also, a promontory on a river, or the tip of the piece of land lying inside a bend of a river *la15–* (*OED3* POINT[22a] *n.*[1]).
– a cape or headland (*CCD* POINT *n.*).
– a point, headland (*PNFIF5*, 472).
– (ModE) a promontory, normally in the Lake District jutting into a lake (*LDPN*, 414).

SSE ***ridge*** < ME *rigge*, *rig*, *rigg* < OE *hrycg*.

Admissible

1 – a long narrow top or crest (*CCD* RIDGE *n.*).
– a ridge. See Sc *rig*[1] (*PNFIF5*, 479).

[Place names from the [English] Danelaw counties and from Scotland generally show the equivalent place-name element *rig(g)* (*OED3* RIDGE[Intro.] *n.*[1]).

ESc ***rig*** < OE *hrycg*. ≈ ON *hryggr*.
Sc ***rig***

Admissible

1 – a ridge of high ground, a long narrow hill, a hill-crest, frequently in place-names *la12–* (*CSD2* RIG[1] *n.*[1.1]).
– a ridge, a long narrow hill or strip of land. In modern Scottish usage the topographical meaning [of Sc *rig*] is usually realised as *ridge* and the agricultural one as *rig*. (*PNFIF5*, 479).
– a ridge of elevated ground; a long narrow hill, or range of hills; a chain of islands, line of rocks, etc. *la15–*(*OED3* RIG[7] *n.*[1]).

[In names ending in *-rigg* in the north of England it is often impossible to distinguish between ON and OE words, and as many of the names will be of ME origin the distinction is mostly irrelevant (*LPN*, 190). *CCD* has no reference to SSE usage as a hill-term. It is assumed to be identical to Sc *rig*[1] in the 23 Berwickshire place-names examined here].

Inadmissible

2 ~ an extent of land, long rather than broad *15–* (*CSD2* RIG[2] *n.*[1.1]).
– (of OE) a strip of land (esp. one growing with trees (*EPNE* RĪC)
3 – (in a town, originally) a piece of land pertaining to a tenement, left free for cultivation; (in later use) a long, narrow lot *16–* (*OED3* RIG[8] *n.*[1]).
4 – one of the divisions of a field ploughed in a single operation *16–* (*CSD2* RIG[3] *n.*[1.1]).
– ridge of land between plough furrows *17* (*OED3* RIG[9] *n.*[1]).
– each separate strip of ploughed land, raised in the middle and sloping gradually to a furrow on either side, and usually bounded by patches of uncultivated grazing; cultivated land; a field *18–* (*CSD2* RIG[4] *n.*[1.1]).
– a raised strip of arable land sloping gradually towards furrows on either side, usually one of a series into which a field is divided: (in early use) often bounded by patches of uncultivated land, (in later use) produced by ploughing up and down alternately. In Scottish use frequently as part of a runrig system *15–* (*OED3* RIG[6a] *n.*[1]).

Br ****ros*** ≈ OG *ros*.

Admissible

1 – flat-topped promontories, both coastal and on river-bends (*BLITON* 2, 256, s.v. *rōs*).
– something forthstanding; a promontory; a moor, heath, plain; a wood (*CPNS*, 116).
2 – high but relatively level ground; upland pasture, moorland (*BLITON* 2, 256, s.v. *rōs*).

G ***ros*** < OG *ros*. ≈ W *rhos*. ≈ Corn *ros*.

Admissible

1 – a headland, promontory, isthmus, peninsula. Also, a wood (*PNFIF5*, 481).
– (W) a moor, a heath; (Corn) a hill, a heath, a headland (*EPNE* *ROS).

Sc ***ross*** ?< G *ros*.

Admissible

1 – [*CSD2* and *DOST* have no reference to usage as a hill-term. However, it may be a loanword into the Scots toponymicon: 'That the same name, Ross, is also found on the Northumberland coast applied to a promontory, makes a Gaelic derivation even more unlikely' *BWKR* ROSS].

OE ***sīde***
ESc ***side*** > Sc *side*.

Admissible

1 – the land side of a slope or hill, a hill-side (*EPNE* SĪDE).
– the sloping surface of a hill, mountain, etc.; such a surface having a particular aspect *OE–* (*OED3* SIDE[10] *n.*[1]).

Inadmissible

2 ~ the edge of, or the area of land adjacent to, a watercourse or body of water; a bank, a shore *la13–* (*OED3* SIDE[11a] *n.*[1]).
~ (ME) the land extending alongside a river, lake, the edge of a wood or village (*EPNE* SĪDE).
3 ~ the face of a cliff *OE–* (*OED3* SIDE[10] *n.*[1]).

Sc ***side*** < ESc *side* < OE *sīde*.

Admissible

1 – a slope, a hillside *la11–* (*CSD2* SIDE[2] *n.*[1]).
– a hill-side (*PNFIF5*, 497).
– a lateral surface *14–* (*CSD2* SIDE[1] *n.*[1]).
– the lateral slope of a hill *15–* (*OED2* HILL-SIDE *n.*).
– a slope or hillside. Chiefly in place names (*DOST* SIDE[6] *n.*[1]).

Inadmissible

2 ~ side, usually referring to land or a settlement beside the feature which forms the specific element of a compound name (*PNFIF5*, 497).
~ the side of a brook, the strip of ground alongside of it *16–* (*OED2* BURN-SIDE *n.*, *cf.* BURN[C2] *n.*[1], WATERSIDE[1a] *n.*).
~ a bank or shore of a sea, river, etc.; the lands adjacent to such a waterway (*DOST* SIDE[7] *n.*[1]).
3 – the edge or outskirts of a wood, town, etc. Also pl. *14–* (*OED3* SIDE[11b] *n.*[1]).
– the edge or outskirts of a forest (*DOST* SIDE[6b] *n.*[1]).
4 – an edge; one half or part; a division, a faction *14–* (*CSD2* SIDE[1] *n.*[1]).
5 – a district or region *16–* (*CSD2* SIDE[3] *n.*[1]).

SSE ***side*** ≈ Sc *side.*

Admissible

1 – the slope of a hill (*CCD* SIDE *n.*).

Inadmissible

2 ~ side, usually referring to land or a settlement beside the feature which forms the specific element of a compound name (*PNFIF5*, 497).
3 ~ a border or bank (*CCD* SIDE *n.*).

Sc ***snuke*** origin obscure

Admissible

1 – a projecting piece of land, a promontory *la14–15* (*CSD2* SNUKE, SNOKE, SNOOK *n.*, *cf.* SNEUG - a hump-like projection, the shoulder or slope of a hill, a crag, a round hill-top, frequently in place-names *19– Sh*.
– a projecting point or piece of land; a promontory *?la13–* (*OED2* SNOOK *n.*[1]).

Sc ***steel, stell*** < apparently ONtb *stællo* 'catching of fish'.

Admissible

1 – a steep bank, esp. a spur on a hill ridge *la12– Bor* (*CSD2* STEEL *n.*[2]).
– a steep bank, the spur of a hill-ridge (*PNFIF5*, 506).

Inadmissible

2 – a place in a river provided with arrangements for spreading salmon-nets *12–la19* (*OED2* STELL *n.*[1]).
3 – a leap [of a fish] (*EPNE* STELL)
– (OE) a leap, spring (*Bos.-Tol.* STILL).
4 – a circular stone-built enclosure or shelter for sheep *18–19*, *20–*, *WC SW Bor* (*CSD2* STELL[1] *n.*[1.1]).
– an enclosure for giving shelter to sheep or cattle, usually circular, smaller than a ‘fold’ and with higher walls. A ring of trees serving as a shelter for sheep or cattle *18–la19* (*OED2* STELL *n.*[4]).

4.2.3 Stage 3 – Co-appellatives

In expounding her thesis, Gelling completely rejects the narrative of a conspicuous topographical feature having provided inspiration for the *subsequent* naming of a nearby settlement, asserting instead that topographical settlement-names were coined *in parallel* with a characterization of their eponymous features, and that this applied in the main to places that were already inhabited prior to the advent of Old English speakers.[125]

> The *dūn* villages have English names, but they cannot be English foundations. On sites like these there must have been settlements when the Anglo-Saxons came. What we see here is not (as is frequently asserted) the coining of an Old English hill-name which was subsequently transferred to a settlement. It is the application to ancient settlements of a new English name, the generic of which embraces both the habitations and the site.
>
> (Gelling 1998, 78)

As noted previously (§2.1.1), Gelling proposes the descriptor 'quasi-habitative' for the generic element in such names, thereby signalling their intermediate position between the major place-name classifications of 'habitative' vs. purely 'topographical' (*LPN*, xvii). Later in her argument she reiterates that: 'the generics should be regarded as denoting both settlement and site' (*LPN*, xix), and '[t]he hills and ridges referred to in settlement-names may be either the site of settlements or adjacent features which serve as visual identifiers' (*LPN*, 143).

Although the term 'quasi-habitative' defines by exclusion, it fails to convey unambiguously the central premise that a reciprocal relationship between topography and settlement underpins the naming of such places. Gelling herself acknowledges this aspect of the hypothesis 'has not yet been understood by all commentators' (*LPN*, xvii), and indeed the above review of studies since *LPN* (§3.1–§3.1.3.3) shows this continues to be a general

[125] Williamson typifies the earlier prevailing view that topographical-names were the primary formation, subsequently transferred to a settlement if one became established (*NPSB*, 49; 68; 95; 96; 100; 108).

issue with understanding and testing the GCH. Although 'quasi-habitative' distinguishes settlement-names relating to the landscape from the other classification, which responds to the presence of a salient building, the question remains of how to speak of the relationship between topographically-named settlements and the objects that characterize them.

Often, we cannot be certain if hills or hill-spurs, for example, ever bore a separate name when a settlement-name was coined, largely because purely topographical names were rarely documented until comparatively recently. And yet, the GCH supposes a more or less simultaneous naming relationship exists, which clearly has two poles: the settlement bears an actual name, whilst the topographical feature has an identity that anticipates it to a certain extent. This situation has points of analogue with the two-stage model of lexicalization proposed by psycholinguistics, with a characterization of an eponymous feature corresponding to the stage of lemma selection (Harley 2013, 385–386) whilst the settlement-name is its actual articulation in speech. In place-naming, the non-settlement pole appears to retain this notional proto-name, which might later be articulated as an independently-named object (often with a modern epexegetic, such as *-Hill*) or it can remain implicit as the inspiration for naming the settlement.

This thesis adopts a new term, *co-appellative*, to describe the phenomenon at the core of the GCH. Co-appellative is:

i. an inferred association (<>) between a topographical settlement-name and a proximal landscape feature based on a shared identity. Thus, Butter Law SWN •R• NT 83403 45195 and Butterlaw SWN •S• NT 83512 44799 are *co-appellative*;

ii. a descriptive formula in the format •R•<>•S•, each half of which will be referred to as a *complement* – the complement of Butter Law •R• is Butterlaw •S• and vice-versa.

Gelling's proposed genesis for co-appellative names finds some support in the ubiquitous phenomenon of a land-holding-name collectively designating both a settlement and its eponymous feature. This observation implies that name-users under most circumstances did not have cause to refer to complements separately (§4.2.3.3). Indeed, the names of Scottish relief-features, as loci in their own right, are seldom recorded prior to the inception of large-scale estate surveying and mapping in the late eighteenth century.[126] A detailed comparison of REELS1 head-names with modern and historical maps reveals only 38% (110/293) have both complements named in the manner just cited for Butterlaw SWN.

Given Gelling's comments, it would seem integral to the concept of co-appellative naming that unnamed complements should be amenable to inference (reconstruction). Notwithstanding the fact that both specific and generic are susceptible to variation or complete substitution (§4.2.1.4), the continuing physical presence of the feature, memorialized by the generic, usually renders that element more resilient to the processes of linguistic erosion for as long as its meaning is understood. Furthermore, the greater frequency of individual generics in place-names generally appears to aid their preservation. Collielaw, [Old] CHK •S• NT 49060 51515 ($_{un1}$ *?* + $_{ESc1}$ *law*^{1}) predicts a Collie Law •R•, which in this instance is the name of the hill at NT 48445 50779. But, had the relief-feature not been recorded with a separate name, a **Collie Law* •R• as a notional identity could still be predicted from Collielaw •S•, despite the fact the specific is obscure.

Since an association derived in part from unrealised or undocumented names and/or locations is evidentially weaker, the nature and therefore degree of researcher intervention necessary to pair complements will be recorded for every relief-feature<>settlement pairing in the corpus. Likewise, place-names, which imply the existence of an unidentified complement, will be signalled and examined. The procedure adopted will encode certainty

[126] Drummond (2007c:27–28) provides a useful overview of the history of hill-name records from *Blaeu (Pont)* in the mid-seventeenth century to the 1st edition OS maps of the mid-nineteenth.

of location as well as whether documentary evidence exists for the name denoting one or both features.

Hitherto, this thesis has flanked OS classification letters with bullets (e.g. •R•, •V•, •S•, etc.) to make them visually prominent in strings of data, and to indicate the context in which a head-name or its historical form occurs in cartographic and textual sources.[127] In place of one character, this convention will now be extended to three, giving nine permutations of relief- and settlement-name evidence in 3^4 (81) theoretical relationships. Although, as will be observed, only a handful of these combinations are actually productive in Berwickshire.

Relief-features	Settlements	Interpretation		
•R•	•S•	documented name	+	documented location
*R•	*S•	inferred name	+	documented location
^{u}R•	^{u}S•	undocumented name	+	documented location
•R*	•S*	documented name	+	inferred location
R	*S*	inferred name	+	inferred location
^{u}R*	^{u}S*	undocumented name	+	inferred location
•R^{u}	•S^{u}	documented name	+	undocumented location
*R^{u}	*S^{u}	inferred name	+	undocumented location
^{u}R^{u}	^{u}S^{u}	undocumented name	+	undocumented location

Table 4.8. Relief-feature and settlement co-appellative codes.

Table 4.8 illustrates the full set of potential complement codes and gives a key to their interpretation. In this new system, the character to the left of the classification letter signals whether the *name* applied to that complement is: documented (•), undocumented (^{u}), or inferred (*). Similarly, the character to the right summarizes the certainty of its *location*, whether: located (•), unlocated (^{u}), or inferred (*).[128] Characterization of the evidence

[127] A full set of OS classification codes can be found in that sub-section of *Abbreviations*. This system, as presented, is an innovation of the present study although the use of capital letters as OS abbreviations is standard.
[128] In the following discussion, a fourth symbol (◌) will be used in co-appellative formulae to indicate any of the three characters (•, *, ^{u}) can stand in this position.

pertaining to each complement allows co-appellatives to be readily grouped and ranked according to degrees of certitude.

In practice, triage Stage 3 was applied to REELS1 in parallel with Stages 1 and 2 (§4.2.1; §4.2.2). As sense definitions were deduced for hill-term elements and the loci of settlements and relief-features identified through mapwork, the nature of the evidence for each complement was encoded. This procedure ensures that every topographically-named settlement is examined with a view to pairing it to a specific relief-feature, where evidence exists for both complements to be established. Reviewing the data in this way also flags up settlements and relief-features for which no complement is apparent (§4.2.3.4; §4.2.3.5).

Although the name of the hill may itself be undocumented or unrealised in many instances, its proximity to a topographically-named settlement permits a linkage. This applies especially to settlements that appear to be sited on unnamed relief-features, e.g. Hutton HUT •S• NT 88880 54922. Occasionally, a mismatch between topography and a proposed etymology occurs, suggesting a hill-term has possibly been misattributed and therefore an alternative etymology should be sought. The absence of a suitable landscape feature is the most frequent warning that a putative etymology should be treated with caution and perhaps discounted. For example, Cloverhall ECC •S• NT 79606 39960, etymologized as $_{\text{SSE1}}$ *clover* + $_{\text{SSE2}}$ *hall* or $_{\text{SSE3}}$ *hill*, lacks any feature that could even remotely be characterized as $_{\text{SSE}}$ *hill*, as duly reflected by the *REELS* certainty code of 3. Such a head-name cannot be used reliably to test the GCH and so it must be relegated to REELS2.

Determining the precise locus of complements – especially the relief-feature – is necessary ahead of conducting the measurement of hills and hill-spurs using software in the next chapter. For this, the six-digit NGR (accurate to 100 x 100 m) employed by *REELS* must be recalculated in each instance to ten-digits (accurate to 1 x 1 m). These co-ordinates correspond to: the highest point of hills and hill-spurs, or most central area of plateaux in the case of relief-features; or, the dwelling house of farms or the earliest known part of settlements, e.g. churches or other significant structures such as historical fortifications. The precise procedure for determining NGRs is given in §5.3.1.1.

The following five sub-sections discuss the co-appellative categories identified in REELS1 at the conclusion of triage Stage 3. The distribution of head-names and a tally of co-appellative pairings per category are summarized in Table 4.10.

4.2.3.1 First-Degree Co-appellatives (•R•<>•S•)

The code •R•<>•S• indicates that each complement is documented as bearing the shared name, and both have accurate documented locations. This means there exists reliable evidence for both complements having developed as distinct yet connected names, and the actual loci of each can be identified accurately from sources. In the case of the relief-complement, this last point is of particular significance to a study seeking to examine the hypothetical relationship between generic elements and landscape, since it is vital to focus on the correct hill. Co-appellatives in this category are assumed to offer the most objective examples against which to test the GCH, since their association is established with a minimum of researcher interpretation.

4.2.3.2 Second-Degree Co-appellatives (•R•<>•S*, *R•<>•S•, •R*<>•S*, *R•<>•S*, •R*<>•S•)

These codes stand a step removed from first-degree co-appellatives (•R•<>•S•) in that at least one characteristic of each complement is documented, and the undocumented characteristic can nevertheless be inferred (*). Specifically:

•R•<>•S* lacks documented evidence of the settlement's location, which is inferred from the documented location of the relief-feature;

*R•<>•S• lacks documented evidence of the relief-feature's identity; which is inferred from the settlement-name;

R•<>•S lacks documented evidence of the relief-feature's identity; which is inferred from the settlement-name, and it lacks documented evidence of the settlement's location, which is inferred from the documented location of the relief-feature;

•R*<>•S• lacks documented evidence of the relief-feature's location, which is inferred from its proximity to the settlement's documented location, provided there are no other candidates vying to be the eponymous hill;

•R*<>•S* lacks documented evidence of the relief-feature's location or the settlement's location, both of which must be inferred from a proximal landscape-feature that conforms to an admissible sense (Table 4.7) of the name's generic element. This is saved from becoming a circular argument by the fact that the names of both complements are documented and therefore describe their loci.

*R•<>•S• accounts for 89% (58/65) of the second-degree co-appellatives in REELS1. The existence of a settlement bearing an unambiguous hill-term name, but lacking a suitably named hill, prompts the search for a plausible complement. Often, the environs of the settlement offer only one conspicuous candidate, especially for elements referring to hills of a greater magnitude or striking appearance, or which stand somewhat in isolation from other hills, e.g. *_Hare Law_ CHS •R• NT 87239 57475. This category of co-appellatives is judged to be almost as reliable as •R•<>•S• (First-Degree), but such hills and hill-spurs will be labelled

*R•<>•S• to facilitate their separate evaluation if in future additional segmentation of the dataset is required.

Cowdenknowes EAR •S• NT 57733 37049 is an important early name that might have been considered under *R•<>•S•, were it not for the fact that **Cowden Knowes* EAR •R• is unlocatable (i.e. *R^{u}<>•S• – §4.2.3.5) and so incapable of testing the element ${}_{\mathrm{Sc}}$ *knowe*[1]. The most conspicuous and proximal relief-features are Black Hill EAR •R• NT 58548 37012 and White Hill EAR •R• NT 57869 37728, whose reciprocal names suggest they form a set, a feature that would fit the plurality of Cowdenknowes. However, the case is quite uncertain given there is no record of these hills having been called collectively *[The] Cowden Knowes*. The element ${}_{\mathrm{Sc}}$ *knowe*[1] (Table 4.7) generally denotes a more diminutive feature, whereas these hills (314 m and 217 m respectively) are far from mere hillocks. Conversely, Camp Knowe MLR •R• NT 54010 35750 (alt. 243 m) and Chester Knowe MLR •R• NT 55538 35637 (alt. 244 m) demonstrate ${}_{\mathrm{Sc}}$ *knowe*[1] has been employed in the naming quite impressive hills within a 5 km radius of Black Hill and White Hill. And yet, it would be a leap of faith to declare them to be the complement of Cowdenknowes EAR •S•.

The five second-degree co-appellatives and the two collocated co-appellatives (§4.2.3.3), illustrated in Table 4.9, form a hierarchy of decreasing reliability. This arises from one of each pair of characteristics (name / identity vs. locus) being more vital to that complement than the other, and from different levels of significance of the same characteristic between complements (•R• vs. •S•), thus (in red):

1st ◌R◙<>◌S◌ (relief-feature location)
2nd ◌R◌<>◙S◌ (settlement-name)
3rd ◙R◌<>◌S◌ (relief-feature name)
4th ◌R◌<>◌S◙ (settlement location).

In essence, the *locus* of relief-features (i.e. their definite identification and measurability) is a more critical requisite for testing the GCH than the documented attribution of their name, since the existence of the settlement-name allows that of the relief-feature to be inferred. Conversely, the *name* of the settlement carries more weight than its location as settlements can be refounded on a different part of a land-holding, or even disappear entirely as a physical entity, without affecting their essential association with an eponymous relief-feature, which, notwithstanding acts of environmental destruction, remains static and present. Given the paramountcy of identifying the correct hill or hill-spur for testing the GCH, it follows that the four characteristics can be used to rank co-appellatives in a descending order of reliability, as shown in Table 4.9.

Code	Characteristics	Co-appellative	
•R•<>•S•	1 documented relief-location 2 documented settlement-name 3 documented relief-name 4 documented settlement-location	**1st degree**	more reliable
•R•<>•S*	1 documented relief-location 2 documented settlement-name 3 documented relief-name 4 inferred settlement-location	**2nd degree**	
*R•<>•S•	1 documented relief-location 2 documented settlement-name 3 inferred relief-name 4 documented settlement-location		
R•<>•S	1 documented relief-location 2 documented settlement-name 3 inferred relief-name 4 inferred settlement-location		
•R*<>•S•	1 inferred relief-location 2 documented settlement-name 3 documented relief-name 4 documented settlement-location		
•R*<>•S*	1 inferred relief-location 2 documented settlement-name 3 documented relief-name 4 inferred settlement-location		
R<>•S•	1 inferred relief-location 2 documented settlement-name 3 inferred relief-name 4 documented settlement-location	**Collocated**	
R<>•S*	1 inferred relief-location 2 documented settlement-name 3 inferred relief-name 4 inferred settlement-location		less reliable

Table 4.9. Co-appellative reliability hierarchy.

A second-degree co-appellative permutation absent from this sequence is •R•<>*S• (inferred settlement-name). All 27 permutations of ◌R◌<>*S◌ are unlikely to occur in practice, as confirmed by their absence from REELS1. They do not occur, although remain theoretically possible, because the name of a relief-feature is almost never documented without the associated settlement also being named when one actually exists. If a settlement-name were to be inferred from its complement, it would have to belong to the nine permutations of ◌R◌<>*S• (inferred name and documented location) since other permutations, ◌R◌<>*S* and ◌R◌<>*S^{u}, are much more likely to be singleton relief-features (§4.2.3.4) for which no settlement can be shown to have existed.

4.2.3.3 Collocated Co-appellatives (*R*<>•S•, *R*<>•S*)

The code *R*<>•S•, which accounts for 98% (120/122) of this category, indicates that only the settlement is documented bearing the name and has a documented accurate location; both the name / identity and location of the relief-feature must be inferred. Nonetheless, this category is closely akin to both first- and second-degree co-appellatives, with the main difference being that the hill-term frequently denotes a less conspicuous feature, which by its nature is apt to be the site of the settlement in the manner proposed by Gelling for $_{\text{OE}}$ _ēg_ (_LPN_, 36) and some settlements in $_{\text{OE}}$ _dūn_ (_LPN_, 164–165). In practical terms, collocation precludes the need for a separate locus or name to be documented, and so a case could be made for viewing the many examples of *R*<>•S• as not materially different from •R•<>•S•. For the present, that possibility will be borne in mind while acknowledging the evidence for a co-appellative relationship is still partially inferred. By way of illustration, Chesterbank AYT•S• NT 94866 60850 predicts *_Chester Bank_ AYT •R•. As no feature corresponding to $_{\text{Sc}}$ _bank_ is documented as a separate place with this name, it is presumed to be the slope on which Chesterbank is situated, the summit of which is *NT 95230 60194.

Without researcher inference, second-degree- and collocated co-appellatives would have been encoded as (the unused categories): •R•<>•S^{u}, ^{u}R•<>•S•, •R^{u}<>•S^{u}, ^{u}R•<>•S^{u}, •R^{u}<>•S•, ^{u}R^{u}<>•S•, or ^{u}R^{u}<>•S^{u}. Attempting to 'restore' the name and/or infer the location of a relief-feature, where plausible, seems preferable to rejecting altogether these categories of slightly weaker evidence that may yet provide valuable insights into naming patterns. This contrasts with 'singleton settlements' (§4.2.3.5) for which the relief-feature evidence is much more tenuous.

4.2.3.4 Singleton Relief-features (•R•<>^{u}S•, •R•<>^{u}S^{u}, •R*<>^{u}S^{u} , *R•<>^{u}S^{u}, *R*<>^{u}S^{u})

Singleton relief-features have evidence for the relief-feature only. The code •R•<>^{u}S^{u} (documented relief-name and documented relief-location) accounts for 93% (130/140) of this type. The related categories *R*<>^{u}S^{u} and *R•<>^{u}S^{u} occur in REELS1 with two and three examples, respectively. Although singleton relief-features are encoded as if they were co-appellatives, the lack of evidence for an associated settlement strongly suggests none has ever existed. A minor category included with this group, •R•<>^{u}S•, encodes the situation where a relief-feature is associated with an accurately located 'settlement', but this bears an appellative in place of a true name, and therefore it is not a co-appellative so defined.[129] Finally, the one occurrence of a named but unlocated relief-feature for which no settlement can be traced (a rare additional category – •R^{u}<>^{u}S^{u}) is returned to REELS2 as evidentially too weak to be useful.

[129] The five Berwickshire examples are: *Black Chester Hill* (> Raecleugh Head Hill) LGT R• NT 74294 53617 <> (hillfort) LAU •S• NT 74350 53510; Mill Braes LKK •R• NT 87892 45376 <> [**Bannockburn*] mill LKK •S• NT 88405 45574; Chester Hill AYT •R• NT 95231 60192 <> (hillfort) AYT •S• NT 95230 60209; Chester Hill LAU •R• NT 52594 46750 <> (hillfort) LAU •S• NT 52621 46824; and Chapel Knowe ECC •R• NT 78734 44045 <> (chapel – ruin) ECC •S• NT 78715 44115.

The value of these categories with the exception of •R^{u}<>^{u}S^{u} is twofold. Firstly, the parameters of singletons can be quantified and compared with the same elements in co-appellatives in order to increase understanding of how particular hill-terms function in different localities. Secondly, due to the impermanent nature of human habitation, there is always the possibility that new evidence from archaeology or textual sources will reveal or offer a glimpse of a lost settlement. Therefore, •R•<>^{u}S^{u}, etc. are provisional classifications that will include true singleton relief-features along with others that may in future become complements to settlements.

4.2.3.5 Singleton Settlements (*R^{u}<>•S•)

The code *R^{u}<>•S• indicates that only the settlement bears a documented name and has a documented accurate location; the name of a relief-feature can be inferred, but its location is undocumented and not inferable. Such 'singleton settlements' may commemorate genuine relief-complements that have been lost to landscape destruction, perhaps through road-construction, opencast mining, and so forth, but their lack of early forms usually suggest a more recent origin. Indeed, place-names in this category come with a warning – they appear to be named for a relief-feature that does not exist. This runs contrary to the premise and practice of traditional place-naming (as investigated by toponomastics), which requires transparency and intelligibility to function (Hough 2012a, 17–18) and also that naming should be systematic (Gelling 1998, 76; *LPN*, xvi, 144).

As noted previously (§4.2.1.6), transferred-names and derivatives, although they may superficially resemble traditional naming, flout its conventions by transplanting or coining place-names without regard for the landscape or an established system. For this reason, they are inadmissible to a corpus seeking to test systematic naming, as by their nature they are one-off and irregular. The same is true of settlements with names that appear to be coined using apparent hill-terms but for which no proximal hill-feature can be located. An example of *R^{u}<>•S• is Crooklaw House ECC •S• NT 76878 44658 with the tentative etymology is $_{\text{OE2}}$ *crūc* + $_{\text{OE2}}$ *hlāw* or $_{\text{Br3}}$ *crǖg* + $_{\text{Sc3}}$ *law* + $_{\text{SSE1}}$ *house* (*REELS*). An alternative derivation of Crook- would be $_{\text{Sc}}$ *cruik* 'a curved or crooked piece of land, a nook or corner; frequently in place-names *13*–' (*CSD2* s.v.), which is also likely to be present in the lost Berwickshire name *Gowanecruke* 1574 *Retours* i, no 480. *PNBWK1* (forthcoming – Eccles *Introduction*) suggests *Cruke Leche* and *Erlis Cruke* (c. 1390 *Laing Chrs.* i, no. 81), recorded in a perambulation of Mersington, may preserve the same element as Crooklaw House, which stands 170 m from a 90° '*cruik*' formed by a bend in Lambden Burn. The absence of a measurable **Crook Law* •R• in the immediate vicinity to test $_{\text{Br}}$ *crǖg*, $_{\text{OE}}$ *crūc*, $_{\text{OE}}$ *hlāw*, or $_{\text{Sc3}}$ *law* causes this place-name to be set aside. Had it progressed to triage Stage 5, a ∑=0.0 'inadmissible' (*Etymology* = 0.0; *Terrain* = 0.0; *Sources* = 0.0) would have resulted.

Implementation of triage Stage 3 has assigned co-appellative categories to 14 inadmissible head-names / spreadsheet-rows of REELS1 belonging to the categories *R^{u}<>•S• (singleton settlements). These are returned to REELS2, thereby increasing the tally of Berwickshire place-names found unsuitable to test the GCH to 1,238 head-names (1,249 rows). Table 4.10 summarizes the incidence of REELS1 toponyms by co-appellative category.

Note: co-appellatives encode the evidence for only one name and one place (the relief-feature). E.g. Butterlaw •S• and Butter Law •R• combine to create one co-appellative, thereby reducing the tally of co-appellatives relative to rows by half. However, in Stage 1, additional rows were generated to permit the separate analysis of multiple elements, loci, etc., and therefore the tally of co-appellatives is not a straightforward 50% of the number of original head-names. The 90 'Sundries' of Table 4.10 represent these additional rows (68) plus the redundant settlement head-names (22) that remain after complements are paired to form co-appellatives. These rows are marked (+) in the co-appellative column of REELS1 and in Vol. III.

Co-appellatives		*Rows*	*Pairings*
First degree	•R•<>•S•	107	107
		107	107
Second degree	•R•<>•S*	3	3
	*R•<>•S•	57	57
	•R*<>•S*	1	1
	R•<>•S	1	1
	•R*<>•S•	2	2
		64	64
Collocated	*R*<>•S•	121	121
	R<>•S*	2	2
		123	123
Co-appellative Total:		**294**	**294**
Singleton relief-features	•R•<>^{u}S•	5	–
	•R•<>^{u}S^{u}	135	–
	•R*<>^{u}S^{u}	1	–
	*R•<>^{u}S^{u}	3	–
	R<>^{u}S^{u}	2	–
		146	–
Sundries		90	–
REELS1 Total:		**509**	**294**
Singleton settlements (transferred to REELS2)	*R^{u}<>•S•	(14)	–

Table 4.10. Tally of REELS1 co-appellatives after triage Stage 3.

4.2.4 Stage 4 – Hill-term Function

In illustration of the elements they investigate, *PNL* and *LPN* offer abundant examples, grouped in the later publication into reference sections and further subdivided according to patterns of use ('simplex name', 'first element', 'generic with personal names', etc.). *HPND*'s Chapter 5 elaborates this aspect of the GCH with a very detailed classification and analysis of the range of elements compounded with hill-terms (collocations) in order to establish the relative frequencies of qualifier-plus-hill-term patterns. Although interesting in its own right, a repetition of this exercise using Berwickshire data would veer away from the current research questions.

PNL, *LPN*, and *HPND* document the position of the hill-term in a toponym (initial vs. non-initial) and whether it functions there as a simplex or part of a compound. *HPND* (p. 327) also indicates the position of the hill-term relative to other elements.[130] However, a fully parsed evaluation of hill-term function has not hitherto been conducted in relation to the GCH. A review of Berwickshire co-appellatives and singleton relief-features finds that hill-terms occur with four identifiable functions, plus a fifth category where the function cannot be determined due to etymological ambiguity.

Triage Stage 4 classifies the toponymic function of REELS1 hill-terms creating sub-sets that could be interrogated separately and compared with other evidence such as co-appellatives codes (§4.2.3) and the three triage criteria (§4.2.5). The initial presumption is that primary generics and simplex names will better reflect the operation of the GCH than hill-terms with other functions, since they are the fundamental classification of the object named ('what' it is) and so likely to be the earliest expression of how the feature was perceived, e.g. as a *law*, or

[130] *HPND* (pp. 341–813) tabulates the elements of its 2,337 examples as 'Element 1', Element 2', and whether an 'Additional Element' is present (i.e. an affix or epexegetic). Hill-terms are most commonly classed as 'Element 2', which reflects the Germanic word-order of the majority of the place-names in Northumberland and County Durham.

a **brun*, etc. Other hill-term functions qualify or describe an object within an existing compound name (e.g. which *tūn* is Hilton WHI); or they name a relief-feature from an established settlement-name (e.g. the *hill* in Trabrown Hill LAU, which denotes the same object as the semantically opaque **brun* – see below); or they designate a relief-feature associated with different object (e.g. Swinton Hill SWN, named after Swinton SWN); or a specific aspect of the same object (e.g. **Wardlaw Bank* CHM, presumably a *bank* on **Ward Law* CHM). A closer consideration of these three examples will illustrate the issues involved in determining generic function in the context of co-appellative naming.

Horseley Hill CHM •R• NT 83248 62073 (Fig. 5.10) is a conspicuous relief-feature of 262 m. As an outlier of the Lammermuirs, it has a commanding view of eastern Berwickshire from due north around to the south-west in an arc of around 225°, which takes in much of the county's coastline and the lower Tweed basin. The farm of Horseley CHM •S• NT 83281 63072, at just under 1 km distant to the north, offers an obvious inspiration for the current name of the hill, and with regard to testing the element $_{\text{SSE1}}$ *hill*^{1}, these places are easily equated as first-degree co-appellatives:

Horseley Hill CHM NT 83248 62073 •R•<>•S• Horseley CHM NT 83281 63072 ($_{\text{en1}}$ *Horseley* + $_{\text{SSE1}}$ ***hill***^{1})

And yet, this is clearly not an example of the simultaneous description of hill and settlement. Horseley •S• ($_{\text{Sc1}}$ *horse* + $_{\text{Sc1}}$ *ley*) is a primary coining from which the adjacent relief-feature has been subsequently renamed. In this instance, it is possible to be certain that Horseley •S• predates the renaming of Horseley Hill •R• because an earlier name for the same relief-feature is extant in another settlement-name: Warlawbank CHM •S• NT 83237 61903, situated near the summit of Horseley Hill. The earliest historical form (*Westerwardelaweside* c.1250 Raine, *ND*, App. no. CXCV) indicates a holding of some importance (*BWKR*, s.n.), but there is a gap in the record of over 500 years before *-side* is superseded by forms in

-bank (*Warrbank* 1771 Armstrong; *Warlawbank* 1796 *RHP*14782). This does not preclude the possibility that **Warlawside* and **Warlawbank* may have been separate settlements in association with different secondary features. Yet, both these place-names point to an original **Ward Law* ($_{\text{ESc1}}$ *ward* + $_{\text{ESc1}}$ *law*^{1}) as the lost name of a relief-feature; the only suitable 'watch hill' in the vicinity being the current Horseley Hill. On balance, a good candidate, at least for the eponymous bank, stands some 80 m distant from Warlawbank in the shape of a prehistoric hillfort with a double rampart, but, in the absence of further evidence and earlier historical forms, the relief-element is analysed as $_{\text{SSE1}}$ ***bank***^{1} rather than $_{\text{Sc1}}$ ***bank***^{6}. Methodologically, the co-appellatives are constructed as:

Ward Law*$_{\{}$ (> Horseley Hill) CHM NT 83248 62078 *R•<>^{u}S^{u} ($_{\text{ESc1}}$ *ward* + $_{\text{ESc1}}$ ***law*^{1} or $_{\text{ESc1}}$ *wardlaw*)

Wardlaw Bank*$_{\{}$ CHM *NT 83237 61903 *R*<>•S• Warlawbank$_{\{}$ CHM NT 83237 61903 ($_{\text{ESc1}}$ *ward* + $_{\text{ESc1}}$ *law*^{1} or $_{\text{ESc1}}$ *wardlaw* + $_{\text{SSE1}}$ ***bank*^{1})

Wardlaw Side*$_{\{}$ CHM *NT 83491 61568 *R*<>•S* *Westerwardelaweside*$_{\{}$ CHM *NT 83491 61568 ($_{\text{ESc1}}$ *wester* + $_{\text{ESc1}}$ *ward* + $_{\text{ESc1}}$ *law*^{1} or $_{\text{ESc1}}$ *wardlaw* + $_{\text{ESc1}}$ ***side*^{1}).

Another example is Swinton Hill (sic) SWN •S• NT 84580 46617. This might be imagined to be co-appellative to Swinton Hill SWN •R• NT 84569 46663, but this appears to not be the case.[131] Although Swinton Hill •S• is documented from 1654 (*Blaeu (Pont) Mercia*), the primary association of Swinton Hill •R• must be with Swinton •S•, documented since c.1100 (Durham MC 556, *ESC* no. xx), thus:

Swinton Hill SWN NT 84569 46663 •R•<>•S• Swinton SWN NT 83839 47598 ($_{\text{OE1}}$ *swīn* + $_{\text{OE1}}$ *tūn* + $_{\text{Sc1}}$ ***hill***^{1}).

This interpretation suggests that Swinton Hill •S• is a coining derived from Swinton Hill •R•, and therefore unsuitable to investigate the GCH (§4.2.1.6). Of course, it is unlikely Swinton

[131] The OS 6 inch 1st edn. map follows the usual practice of showing the settlement as *Swintonhill*, but this has been (?erroneously) amended to Swinton Hill on OS maps after c. 1937.

Hill •R• was named contemporaneously with Swinton •S• since the settlement does not bear a topographical settlement-name.

A final example is Trabrown Hill LAU •R• NT 50019 48561. This name taken at face-value would imply an association with Trabrown LAU •S• NT 51070 49069, were it not for the fact that *-brown* represents the hill-term $_{\text{Br1}}$ **brun*^{1}, which belongs to a much earlier linguistic stratum and so precludes a name in $_{\text{SSE1}}$ *hill*^{1} being a primary formation, even if the same relief-feature is connoted by both terms:

**Ir Brun* (?> Trabrown Hill$_{\{}$) LAU NT 50019 48561 *R•<>•S• Trabrown$_{\{}$ LAU NT 51070 49069

($_{\text{Br1}}$ *trev* + $_{\text{Br1}}$ **i*(*r*) + $_{\text{Br1}}$ ****brun***^{1})

Trabrown Hill$_{\{}$ LAU NT 50019 48561 •R•<>•S• Trabrown$_{\{}$ LAU NT 51070 49069

($_{\text{en1}}$ *Trabrown* + $_{\text{SSE1}}$ ***hill***^{1})

OSNB (c. 1858) offers further evidence for the late naming of the derivative: Trabrownhill LAU •S• NT 50199 48172 is described as a 'large and comfortable dwelling house recently erected…' (OS1/5/28/132). It is conceivable this evidence might also date the coining of Trabrown Hill •R• since that name is undocumented before 1862 (*OS 6" BWK*, XIX, inset XXV).

At this stage, an obvious factor in attempting to distinguish primary formations from later derivatives is the role of the generic. In (Horseley Hill •R• vs. **Ward Law* •R•), (Swinton Hill •S• <> Swinton Hill •R•), and (Trabrown Hill •R• <> Trabrown •S•), each *hill* is secondary to a known or inferred primary generic – $_{\text{Sc1}}$ *ley*, $_{\text{OE1}}$ *tūn*, and $_{\text{Br1}}$ *trev*, respectively. Determining whether generics are either primary (i.e. the only generic element in a toponym) or secondary (i.e. the later of two) offers a method to compare against other forms of evidence. On this basis, the role of REELS1 hill-terms will be classified as:

- primary (G_1) – the hill-term is qualified by a specific (e.g. Kelloe$_{\{}$ EDR);

- secondary (G_2) – the hill-term is qualified by an existing name (e.g. Ayton Hill AYT);
- specific (S_p) – the hill-term qualifies a generic (e.g. Hilton WHI));
- simplex (S_x) – the hill-term is unqualified by another element (e.g. Hume HUM); or
- uncertain (U_n) – the etymology cannot predict the role of the hill-term (e.g. Bartle Hill$_{\{}$ ECC – does *-le* represent $_{\mathrm{Sc}}$ *hill* or $_{\mathrm{OE}}$ *hyll* or something else?).

This five-fold categorization is also applied to REELS1 co-appellatives and singleton relief-features to permit future segmentation and analysis of the corpus by hill-term function.

4.2.5 Stage 5 – Toponymic Triage of REELS1 (Final)

To summarize the process of preparing data to test the GCH so far: the dataset REELS1 (final) has been filtered to remove derivative and transferred names (§4.2.1.6), and elements with non-hill-descriptive senses (§4.2.2). Relief-features (documented and inferred) have been paired with their co-appellative settlements (§4.2.3–§4.2.3.3); hills without settlements have been differentiated (§4.2.3.4); and any settlements lacking relief-complements have been set aside (§4.2.3.5). Finally, co-appellatives and singleton relief-features have been analysed for function relative to other elements (§4.2.4). The result is 532 relief-feature rows, arranged into 295 co-appellatives and 147 singletons. REELS1 (Final) will be now expanded to include the triage fields (§4.1).[132]

Toponymic Triage piloted previously (§4.1.1) using the data from Pratt 2005 is now applied to REELS1 (Final), and the results, grouped by triage label, are sorted alphabetically by element. This is *Appendix A*. It should be reiterated that toponymic triage is not an

[132] REELS1 (*Appendix A*) specifies: toponymic element; relief-feature name; civil parish; NGR; toponymic role (*Function*); the three triage criteria (*Etymology*, *Terrain*, *Sources*), ∑, and label (*Testability*); and a co-appellative code.

evaluation of the GCH. Rather, it is a filtering of place-names to establish there is sufficient confidence that a target generic element is present for Gelling and Cole's ideas to be tested.

4.2.6 Stage 6 – Compilation of BWK1, BWK2, and BWK3

The final triage stage consists simply in the rearrangement of REELS1 (Final) into corpora that will be measured and tested in Chapter 5 and compared with selected *LPN* examples in Chapter 6. Co-appellatives with ∑≥2:0 (triage labels in the blue spectrum) are transferred to BWK1 (*Appendix I*), sub-divided there by co-appellative type and grouped by hill-term. Singleton relief-features (§4.2.3.4) with ∑≥2:0 are transferred to BWK2 (*Appendix J*) and similarly arranged. Finally, BWK1 and BWK2 are combined to create an alphabetical index, BWK3 (*Appendix K*). This presentation across three related tables allows for the display of a larger amount of data and for attributes to be grouped in different configurations (§3.1.3.3).

	REELS1		REELS2		Totals	
	(rows)	%	(rows)	%	(rows)	%
•S•	244	46	717	57	**961**	54
•R•	270	51	52	4	**322**	18
•V•	8	2	178	14	**186**	10
•W•	0	0	172	14	**172**	10
•A•	1	0	36	3	**37**	2
•O•	0	0	48	4	**48**	3
•C•	9	2	36	3	**45**	3
•F•	0	0	6	0	**6**	0
•I•	0	0	4	0	**4**	0
Totals:	**532**	100	**1,249**	100	**1,781**	100
	30%		**70%**		**100%**	

Table 4.11. Hill-terms vs. non-hill-terms in Berwickshire place-names by OS classification.[133]

[133] *REELS* attributes multiple OS classifications to some place-names. Table 4.11 reflects a reclassification of such names by selecting their most salient attribute relative to the GCH, using the following schema: •AE•, •AEV•, •AO•, •AP•, •AW• > •A•; •CR• > •C•; •E• > •A•; •FV• > •F•; •OV• > •V•; •RV• > •V•; •RW• > •R•; •SP• > •S•; and •VW• > •W•.

Having reached the final versions of REELS1 and REELS2, two general aspects of the pattern of place-naming in Berwickshire are immediately apparent. The overall split of settlement-names (54%) vs. non-settlement-names (46%) is roughly equal allowing for the fact that the attribution of OS classes is approximate rather than precise in some cases. For example, a 'predominantly or exclusively watery connotation' is the salient attribute of OE *mōr* (*LPN*, 36), which is often classified as •W•, whereas *REELS*, focussing on the relief aspect, classifies this element as •R•.[134] Apart from the six *PNBWK1* parishes, *REELS* does not aim to survey every recorded Berwickshire place-name. Nonetheless, Table 4.11 reveals that even with a broad overview, topographical formations are almost as numerous as habitational names and they would most likely be the larger category if micro-toponyms were included.

Secondly, one quarter (244/961; 25.4%) of Berwickshire settlement-names are co-appellative with a proximal hill, whilst eight out of ten named hills (270/322; 83.9%) are co-appellative with a settlement. This suggests that co-appellativity is a significant factor in the motivation for hill- and settlement-naming, but also a considerable disparity exists – relief-features are far more likely to share their name/identity with a settlement than vice-versa (§7.3).

The remainder of this chapter will progressively augment the datasets BWK1, BWK2, and BWK3. Previous studies (*NPSB*, *BONG*, and *PBWK*), focussing on Berwickshire toponyms, will be compared in turn against BWK3 and additional names added where appropriate[135]. As these studies offer research of quite different levels of reliability, additional place-names sourced from these will be treated with more or less credence: *NPSB*, a PhD thesis from 1942, is excellent in its reliability, but requires reanalysis of its conclusions in light of more

[134] Lammermuir Hills ASB CRS LAU LMS WRR •R• is the only *REELS* example.
[135] In practice, the excluded toponyms of REELS2, NSPB2, and BONG2 were also compared for completeness.

recent scholarship; *BONG*, a PhD thesis from 2016, is another excellent source and any additions it provides can been treated with a high degree of confidence; *PBWK*, as its review demonstrates (§3.2.1) is research of an altogether different grade – toponyms additional to BWK3 will be considered last and only admitted to the corpus if sources can be traced and independent verification established.

4.3 'The Non-Celtic Place-Names of the Scottish Border Counties' – data

The incidence per county of selected topographical elements extracted from *NPSB* is summarized in Table 3.2. As noted in the review (§3.2.2), Williamson analyses 91 Berwickshire toponyms, which she groups by element under the categories 'Old English', 'Middle English', and 'Scandinavian, and Middle English of Scandinavian origin' (*NPSB*, i). Included with each head-name is one or several early forms, the sources for these, and a brief discussion of the specific element along with occasional references to comparable place-names and elements elsewhere.

Whilst Scots is frequently mentioned *inter alia*, this general arrangement of listing selected place-names under a stage or aspect of the evolution of English does not unequivocally clarify the presumed language of origin for individual toponyms. The *Preface* rightly cautions: '[i]t is almost impossible to date Scottish place-names with any certainty since spellings for the majority are not found before the 13th century' (*NPSB*, i), and although there is no suggestion that all the names grouped under, say, 'Old English' were coined before 1100, the citing of an Old English element in the discussion of later historical forms does nothing to indicate the verifiable origin.

Since there exists a definite *terminus post quem* on account of the sources quoted, an alternative arrangement that might have been adopted would have been to signal the earliest demonstrable language for each element – often a stage of Scots; very rarely is the origin Old- or even Middle English.[136] Paterson in his new *Preface* (2nd unnumbered page) alludes to this manner of presentation, prevalent in the early years of *SEPN*, as one of the few aspects of *NPSB* that detracts slightly from the otherwise excellent quality of the scholarship. This flaw is more than recompensed however by Williamson's own innovation of abandoning the *SEPN* model of parish by parish analyses in favour of an element-focussed approach (*NPSB*, i), thereby offering greater utility to research of the present kind.

The dataset NPSB2 (*Appendix D*) reproduces Williamson's etymologies for the 91 Berwickshire names. An abbreviated language(s) of origin has been prefixed there to each element where this is explicit or can be inferred from the text.[137]. A comparison of NPSB2 with BWK3 identified nine additional head-names, which will now be reviewed. The etymologies cited are Williamson's own. Updated etymologies shown in square brackets.

4.3.1 ***Clortysyd*** GOR •S• *NT 64??? 45???

$_{\text{?Sc}}$ *clarty* (≈ $_{\text{Sc}}$ *clorty*) or $_{\text{?Sc}}$ *clotty* (< $_{\text{ME}}$ *clott* 'clod, lump') + *sīde* (*NPSB*, 61)
[$_{\text{ESc3}}$ *clarty*, *clorty* + $_{\text{ESc1}}$ *side*^{2}]

Clortysyd, c. 1170 *(16th) Dryburgh Liber* no. 126
Clottyside, c. 1350 *Dryburgh Liber* no. 284

Although *Dryburgh Liber* no. 126 places this name after the preposition *subtus* 'below' which makes a hill-sense more likely, without a more accurate location as evidence for the meaning of the specific, it is impossible to properly judge which sense of $_{\text{ESc}}$ *side* should apply. Therefore, *-syd* has been interpreted as $_{\text{ESc}}$ *side*^{2}, which is the least improbable guess

[136] §1.4.2.1 discusses the rationale for adopting this alternative approach to language labels, which allows the dataset to be segmented chronologically.
[137] A *REELS* etymological certainty level has not been added to *NPSB*'s proposed language of origin. Instead, the author's comments have been interpreted into the following schema: $_{\text{OE}}$ *sīde* = 'certainly $_{\text{OE}}$ *sīde*'; $_{\text{OE?}}$ *sīde* = 'perhaps $_{\text{OE}}$ *sīde*'; and $_{\text{OE??}}$ *sīde* = 'doubtfully $_{\text{OE}}$ *sīde*', etc.

and the most common yet 'inadmissible' sense in Table 4.7. *NPSB* tentatively suggests two specific elements, both of which were first recorded in the late sixteenth century (*DOST* s.nn.). The confirmation of either in this name would antedate the *DOST* entry for that word by at least two centuries. For the present, *Clortysyd* cannot be triaged beyond Stage 2 due to uncertainty over the hill-term.

4.3.2 **Deanberry Hole** CBP •R• NT 76932 72027

dean + $_{\mathrm{OE}}$ *berg* (> $_{\mathrm{MSc}}$ *berȝ*) + *hole* or $_{\mathrm{OE}}$ *holt* 'hill beside a dean' (*NPSB*, 65)
[$_{\mathrm{Sc1}}$ *dene* + $_{\mathrm{un1}}$? + $_{\mathrm{Sc1}}$ *hole*]

Denberryholt 1654 *Blaeu (Pont) Mercia*
Deanberry Hole 1856–7 *OSNB* OS1/5/8/9
Deanberry Hole 1857 *OS 6" BWK*, I

Unfortunately, $_{\mathrm{MSc}}$ **berȝ* or possible variants are unknown to *DOST*. The element $_{\mathrm{OE}}$ *holt* has not been identified north of Cheshire and West Yorkshire (*LPN*, 233), thus making a Berwickshire occurrence improbable. The location of this name in a 'bold precipitous part of Dunglass Dean along the base of which Dunglass Burn runs with great velocity' (*OSNB* OS1/5/8/9) well suits $_{\mathrm{Sc}}$ *dene* as the first element, and $_{\mathrm{Sc}}$ *hole* 'an opening,…or cavity' (*DOST*) describes the enclosed area of land beside the burn where the gorge widens. With *Blaeu (Pont) Mercia* as the only other source before the mid-nineteenth century, the proposed second element remains doubtful. As the clear presence of a hill-term cannot be established, this name is not triaged beyond Stage 1.

4.3.3 **Head Chester** CBP •S• NT 81647 69382

OE? *hōh* + OE? *ċæster* 'fort on a hill-spur' (*NPSB*, 24)
[Sc2 *heid*[2] + Sc1 *chester*]

Hoechesters 1654 *Blaeu (Pont) Mercia*
Headchester 1752×1755 *Roy*
Highchester 1771 *Armstrong*
High Chester 1785 *Ainslie*
Highchester 1797 *Blackadder*
Highchester 1821 *Thomson*
Head Chester 1855–56 *OS 6" BWK,* IV

Without earlier historical forms, it is impossible to determine whether the first element represents a hill-term as oppose to an adjectival use of Sc *heid*. The nearest earthwork that could serve as a referent for second element stands at NT 83160 69329, some 1.5 km distant.[138] Lacking a definite hill-term and relief-feature locus, this name cannot be triaged beyond Stage 1.

4.3.4 ***Milcheside*** (> Milsie Burn) LAU •S• *NT 53??? 45???

milk + OE *sīde* 'hillside of rich pasture, which produced a good yield of milk' (*NPSB*, 61)
[ESc1 *milk*e + ESc1 *side*[1]]

ad petarium de *Milchenside* c. 1175×1190 *RRS* ii no. 301 (= *Dryburgh Liber*, App. no. 1 [Richard de Moreville, constable of the kingdom of the Scots, has given and granted … to the Hospital of Lauder … a way through the land of the monks of Melrose up to the peatary of Milchenside]
ad vadum de *milkesideburne* c. 1170 *Dryburgh Liber*, App. no. 1, p. 269 [Donation by Richard de Moreville, constable of Scotland, to the Brethren of the Hospital of Lauder]
totam terram de *Milkeside* 1188 *RRS* ii no.108 [= *Melrose Liber* i. no. 108. Richard de Moreville, constable of the king of Scotland, and Avicia, his wife, ha[ve] given … to Melrose Abbey … the whole land of Milcheside]
in territorio de *milcheside* 1188 *RRS* ii no.108 [= *Melrose Liber* i. no.108. Melrose Abbey … will provide for Richard and Avicia’s infirm in the territory of Milcheside]
totam terram de *milcheside* 1189×1190 *RRS* ii no. 96 [= *Melrose Lib*er i. no. 96. King William confirms the gift of Richard de Moreville, constable of the king of

[138] Personal correspondence with Liz Curtis (April 2020), to whom I am grateful for this suggestion.

Scotland, and Avicia, his wife, to Melrose Abbey … the whole land of Milcheside]
totam terram de *milcheside* 1189×1190 *RRS* ii no. 301 [= *Melrose Liber* i no. 96. King William to Melrose Abbey; has given and confirmed the clearing of Blainslie (ROX); land of Milcheside]
in augmentum terre de *milcheside* 1189×1195 *Melrose Liber* i. no. 99 [Land granted by William de Moreville, in augmentation of Milcheside]
totam terram de *milkeside* 1189×1196 *Melrose Liber* i. no. 109 [William de Moreville, constable of the king of Scotland, has granted … to Melrose Abbey … the chapel of Saint Mary of Park on Leader (ROX) … and establishes to them the whole land of Milkeside]
in augmentum terre de *milcheside* 1189×1196 *RRS* iii no. 14 [= *Melrose Liber* i. no. 100. Land granted by William de Moreville, in augmentation of Milcheside]
de tota terra de *milkenesside* 1214×1249 *Melrose Liber* i. no. 174 [King Alexander confirms the gift of Richard de Moreville, constable of the king of Scotland, and Avicia, his wife, to Melrose Abbey … the whole land of milkenesside]
Milseyburn c. 1550 *Laing Chrs.* i, no. 569
Milsie Burn 1862 *OS 6" BWK*, XIX

This is the 'lost' name of a substantial landholding located somewhere between Blainsley MLR and Lauder LAU in the area currently occupied by Woodheads LAU and Lauder Barns LAU. Barrow (*RRS* ii no. 301, p. 319) identified *Milcheside* with the *Milseyburn* cited above. This name is extant as Milsie Burn LAU/MLR •W• NT 55067 46252 and the surrounding topography makes $_{\text{ESc}}$ *side*[1] the most probable interpretation. The *NPSB* etymology of the first element is plausible and parallels the metaphor of Butter Law SWN •R• NT 83403 45195, 'a hill distinguished for its rich grazing producing butter' (*BWKR* s.n.). The earliest previous record of $_{\text{ESc}}$ *milke* is 1380 (*DOST*).[139] This important early name could be triaged and achieved a ∑=3.0 'proven' for the co-appellative *R*<>•S*.

4.3.5 **Pilheuch** AYT •R• *NT 92984 61211

$_{\text{MSc}}$ *pile* + $_{\text{OE}}$ *hōh* (*NPSB*, 58, 76)
[$_{\text{Sc1}}$ *pele* + $_{\text{Sc1}}$ *heuch*[1]]

pile of Ayton 1542 *Ham. Pap.* i, p. lxix

[139] Dunlop identifies another early field-name, *Milchope* ×1203 *ND*, App. no. CCLXV, *NT917662, which also appears to contain this element (*BONG* i, 147). See also Scott (2004, 326–327).

Peilheuch 1552 *Var. Coll.* v, p. 68
Pilheuch 1568 *Var. Coll.* v, p. 69
Peilheuch 1623 *Var. Coll.* v, p. 70

The NGR is centred on the steep hill-face ($_{\text{Sc}}$ *heuch*) between Ayton Castle (NT 92895 61379) and Eye Water. *Blaeu (Pont) Mercia* depicts in red a substantial boundary wall, transverse to this slope, which encloses a considerable area of adjacent woodland. With the exception of Lauder LAU, this depiction by Blaeu contrasts with other Berwickshire castles and fortified houses on the same map. These sketch a palisade ($_{\text{Sc}}$ *pele*) of vertical hatching, closer in representation to 'an exterior stockade thrown up round a castle enclosing an area in which there might be buildings and even meadow-land' (*NPSB*, 76). The reason for this pictorial distinction is unclear, although the legislation of 1535, requiring the construction *barmkynnis* 'walls of defence' and *pelis* 'palisades', does distinguish degrees of fortification relative to the rental income of the proprietor.[140] Lacking earlier forms – albeit this name may have been coined 1535×1542 – the hill-term is judged at triage Stage 2 to be $_{\text{Sc}}$ *heuch* rather than $_{\text{OE}}$ *hōh*, and is therefore an inadmissible sense definition (Table 4.7, s.v.).

4.3.6 **Redbraes Castle** PWH •S• NT 74641 48524

red + $_{\text{MSc}}$ *bray* (< $_{\text{ON}}$ *brá*; > $_{\text{ModSc}}$ *brae*)[141] 'red slopes' (*NPSB*, 102).
[$_{\text{Sc1}}$ *reid* + $_{\text{Sc1}}$ *brae*^{1}]

Redbraes 1518 *HMC* (*March*), no.13
Redebrays 1532–1533 *HMC* (*March*), no.18
(the tower of) *Redbrayes* razed 1545 *Gairdner and Brodie* vol. 20, part 2, p. 199
Reidbrayis 1567 *RMS* iv, no.1797
Redbrayes 1599 *Retours* BWK ii, no. 520
Reidbrayis 1611 *Retours* BWK i, no. 97
Reidbrais 1625 *RPC* i, p. 647 [*Hardenis Reidbrais* (an estate name)]
Reidbrayis 1650 *Retours* BWK i, no. 286
Redbrease 1650 *HMC* (*March*), no. 96
Ridelbraes 1654 *Blaeu (Pont) Mercia*
Redbraes 1752×1755 *Roy*

[140] *RPS*, 1535/31, accessed: April 2020.
[141] This is a paraphrase of the *NPSB* etymology of *Redbraes Castle* rather than *DOST*'s position regarding the development of $_{\text{ESc/MSc}}$ *bra* < $_{\text{ME}}$ *bra*, *bro* < $_{\text{ON}}$ *brá*; > $_{\text{ModSc}}$ *brae*.

Redbraes Castle (*rems. of*) 1862 *OS 6" BWK*, XXII

Porphyry (a red igneous rock) was quarried on Kyles Hill PWH (NT 72756 50064), some 2.4 km to the north-west of Redbraes Castle. A section of the northern slope of the hill is drained by the burn, Red Score PWH •W• NT 73172 50830. Whether or not the name, Kyles Hill (earlier *Stainmuir law* 1654 *Blaeu (Pont) Mercia*), contains $_{Sc}$ *keel* 'ruddle, red ochre (used for marking sheep)' (*CSD2*)[142], it is apparent that the salient characteristic of the geology of this area has led to $_{Sc}$ *reid* and related colour-terms being used to coin a cluster of local place-names that include Redbraes Castle. Following the destruction of Polwarth Castle in the 1540s, Redbraes became the seat of the Humes of Polwarth and Redbraes. It was superseded in turn in the 1740s following the construction of Marchmont House, in the grounds of which a portion of the ruined castle is extant (*OSNB* OS1/5/38/47). This place-name could be triaged and achieved a ∑=2.5 'very probable' for the co-appellative *R*<>•S•.

4.3.6.1 **Swardon Burn** PWH •W• NT 74394 48848

[$_{Sc3}$ *sward* + $_{Sc3}$ ***doun***[1]]

Swardon Burn 1862 *OS 6" BWK*, XXII

Supplementary to NPSB – That Redbraes (Castle) is unattested before 1518 is curious and hints that the associated relief-feature, which eminently suits the siting of a settlement, may have had a different earlier name. The topography of the whole hill, as opposed to the eponymous *braes* to the south and east, is reminiscent of the *LPN* description of $_{OE}$ *dūn* (pp. 164–167). Equally curious, is the name Swardon Burn PWH •W• NT 74394 48848, a watercourse flanking the northern and western slopes of the hill occupied by both

[142] *PNFIF2* (p. 330) tentatively proposes this element for Keil Burn LAR, and the associated Keil's Den. Of the three possible etymologies in *BWKR* suggested for Kyles Hill PWH, $_{pn}$ *Kyle* is preferred by Taylor (personal communication).

Marchmount House and Redbraes Castle. Unattested before the OS 6 inch 1st edn. map, Swardon Burn may possibly preserve an earlier lost $_{\mathrm{OE}}$ *dūn*. Close by the burn runs a main transport route linking three other Berwickshire 'high-status' (*LPN*, 165) settlements with names in *dūn* that have also become parishes: Earlston EAR (**Arkils dūn*), Gordon GOR (**Goru dūn*), and Duns DNS (**Dūnas*).

Specifics referring to vegetation are characteristic of one class of names in *dūn* (*LPN*, 167), which may suggest an attributive use of $_{\mathrm{Sc}}$ *sward* (< $_{\mathrm{OE}}$ *sward*) '(grassy) turf; meadow, meadowland' (*DOST*, s.v.), although without early forms this speculation is reflected in the ∑=1.0 'unlikely'. Notwithstanding this, **Swar(d) dūn* will be tested along with confirmed names in $_{\mathrm{OE}}$ *dūn* / $_{\mathrm{Sc}}$ *doun* to explore the possibility it could be the co-appellative (*R*<>^{u}S^{u}) of a lost settlement-name. This will be an experiment to examine whether $_{\mathrm{OE}}$ *dūn* / $_{\mathrm{Sc}}$ *doun* are plausible in the case of the hill at NT 74266 48497 (§7.3).

4.3.7 ***Shollesclif*** (Choicelee) LGT •S• NT 74787 51356

$_{\mathrm{pn}}$ *Cēolwulf* + $_{\mathrm{OE}}$ *clif* (*NPSB*, 31)
[$_{\mathrm{ESc2}}$ *schule* 'shovel' or $_{\mathrm{ESc3}}$ *sceolh* 'awry, winding, sloping' + $_{\mathrm{ESc1}}$ **clif*^{2} 'escarpment']

(quedam tenementa in) *Shollesclif'* 1336×1337 *CDS* iii, 368 [John de Hordene forfeits certain tenements in *Shollesclif'* in barony of Langton (que sunt de pertinenciis baronie de *Langtone*)]
Chowslie 1518 *Var. Coll.* v, no.172 ['Christopher Cokburne of']
Schoslie 1537–8 *Coldstream Cart.* Supplement to Preface no.v, p. 86. ['Willelmus Cokburne de']
Chouslie 1537–8 *Coldstream Cart.* no. vii ['Willelmus Cokburne de']
Chowslie 1539 *Laing Chrs.* i, no. 432 ['William Cokburne of']
Chowslie 1539 *Laing Chrs.* i, nos. 434, 435 ['William Cockburn of']
Schowslie 1572 *Var. Coll.* v, no. 135 ['James Cokburne of']
Schowslie 1541 *Acta Conc.* i ['William Cokburn of']
Schowslie 1571 *Laing Chrs.* i, nos. 858, 950 ['James Cokburne of']
Chowislie 1590 *RPC* iv, p. 783 ['Guidman of']
Chowislie 1591 *RPC* iv, p. 811 ['Williame Cokburne of']
Chouslie 1609 *Laing Chrs.* i, no. 1539 ['William Cokburne of']
Chouslie 1609 *Laing Chrs.* i, no. 1539 ['William Cuik, schoolmaster of']

Chouslie 1611 *Laing Chrs.* i, no. 1618 ['fortalice of'][143]
Woid of Chowslie 1625 *RPC* i, p. 647
Cheuslie, *Chouslie* 1627 *Reports* 16 ['Chrestopher Cokburn off']
(lands of) *Chouslie* 1627 *Reports* 17
Chowslie c.1636×1652 *Gordon* no. 58
Chaussley 1654 *Blaeu (Pont) Mercia* [*Chaussley woode* is also marked]
Chouslie 1664 *Com Rec Laud.*
Chouseley 1692 *Retours* (BWK) i, no. 447
shously 1752×1755 *Roy*
Choicelee 1771 *Armstrong*
Choicelee 1862 *OS 6" BWK*, XVI

Williamson lists *Shollesclif* as a 'lost' name, but with her usual perspicacity goes on to suggest it may perhaps share its first element with Choicelee LGT (*NPSB*, 58), observing: 'The [1518] spelling is so late that considerable corruption, or, at least, simplification, may already have taken place' (*NPSB*, 31). Indeed, it appears Williamson was very near the mark in that *Shollesclif* is almost certainly an earlier form of Choicelee.

The escarpment between Choicelee and Langton Burn would suit an etymology in ESc **clif*^{2} (Figs. 4.1–4.3). In England, the development of OE *clif* > /li/ in word-final syllables is well-attested.[144] Gelling (1978, 205) suggests Notley BUC, ESX (< *hnut clyf*) and Hawksley (< *hafoces hlewe* BRK, *hafoceshlæwe* WOR) show analogous reformation (i.e. *-l(e)y* < OE *clif* / OE *hlāw* / OE *lēah*) stemming from the ubiquity of OE *lēah* in the areas these names occur. In Berwickshire, OE *lēah* has not been confidently established, but *-law*, locally /-Lɪ/, does have a very high incidence and could have provided a comparable stimulus for re-formation.[145] This raises the possibility that other Scottish names in *-law*, for which early forms are wanting, could have parallel origins. Possible candidates include Crunklaw EDR and

[143] *Canmore* has no record of a defensive structure at Choicelee, although clearly the construction of such would have been required of the Cockburn proprietors under the 1535 Act of Parliament.
[144] Cookley WOR (*Colecliff* 1275 *CDEPN*, 156); Cronkley NTB (*Crombeclyve* 1268 *CDEPN*:170); Gatley CHE (*Gateclyue* 1290 *CDEPN*, 246); Hamley YON (*Hamclife* 1201 *VEPN*, 104); Heckley NTB (*Hecclive* c. 1250 Mawer 1920, 108-109); Winslow BRK (*Wendelsclivam* c. 1150 Gelling 1974, 346). The loss of /-f/ is attributed to Anglo-Norman influence, *cf*. *joli* < *jolif* (*EPNE*, 98).
[145] Further examples of this realisation of *-law* include: Greenlaw GRE /ˈgrɪnLɪ/; Hawkslaw CSM /ˈhɔksLɪ/; and Ryslaw FOG /ˈraizlɪ/. Oatlee Hill CHM NT 88361 69487, earlier *Outlaw Hill* 1858 *OS 6" BWK*, V (Sc1 *oat* + Sc1 *law* – dated as Scots from earlier attested derivatives), shows the orthography has caught up with contemporary speech.

Wrinklaw LMS (see below), as well as Wormerlaw ECC, which *NPSB* connects with the early name *Wyrmsclif* (q.v.).

Fig. 4.1. Choicelee LGT (aerial view) ?< ESc2 *schule* 'a shovel' [– –] + ESc1 **clif*² [– –].

The specific of Choicelee is highly problematic. Wettstein (1942, 33, 53) documents onset variation between /tʃ/ and /ʃ/ in local subdialects of Berwickshire Scots, noting the affricate had almost completely ousted the fricative by the early 1930s.[146] Such oscillation is evident in the early forms of Choicelee, although /ˈtʃɐʉsLɪː/ is the contemporary pronunciation. We may hazard two provisional etymologies.

The persistent genitive /s/, if correctly identified, would suggest the specific is a pre-existing toponym, or more probably a personal name or hydronym. Langton Burn, flowing below the

[146] Examples of this development include: *chair* /(t)ʃəjər/; *charge* /(t)ʃe·rdʒ/; *cheese* /(t)ʃiːz/; *chew* /(t)ʃʌu/; *Chirnside* /(t)ʃɛrset/.

escarpment at Choicelee, has a conspicuous number of meanders along its course, hinting at a derivation from $_{\text{OE}}$ *sceolh* 'squinting, awry'. The transfer from watercourse to settlement of an epithet derived from the related term, $_{\text{OE}}$ **sceolge* 'the winding one', has been proposed for Shellow Bowells ESX (*CDEPN* s.n.). A further sense of $_{\text{OE}}$ *sceolh* 'sloping' is mooted for Shoulton WOR and Showley LNC (*ibid.*), which are sited similarly on sloping ground. For Choicelee, this etymology would require the word boundaries of **sceolh clif* /-Lx kL-/ to coalesce as *Schowslie* /-ʉsL-/ with a substituted fricative. *DSL* notes that $_{\text{ModSc}}$ *shauch* 'wry, askew, twisted' is not attested in Older Scots and might have arisen as a back-formation of *shauchle* 'to walk without lifting the feet', but if $_{\text{OE}}$ *sceolh* is the specific in this Berwickshire name, the form *Shollesclif* would propose $_{\text{ESc}}$ **s(c)holch* < $_{\text{OE}}$ *sceolh*.

Alternatively, *sholles-* may represent the genitive of $_{\text{Sc}}$ *s(c)hule* 'shovel' (*DOST*) designating a shovel-shaped feature.[147] Cullen has suggested the cognate Old English element occurs in Sholden KNT, $_{\text{OE}}$ *scofl* + $_{\text{OE}}$ *dūn* (*CDEPN* s.n.), remarking:

> Gelling (1984), following Ekwall (DEPN), cautiously offers 'shovel-shaped hill', *v.* **scofl**, **dūn**, and she notes that a low spur made by the 50' contour runs out into marshland. Such a name may sound rather unlikely, but if one regards this spur as the handle, then the whole *dūn* does look remarkably shovel-shaped. Sholden village sits upon the blade, and the handle stretches away to the NW. I think, on the map at least, this image is convincing, and I see no need for the more specific suggestion in Smith 1956 that *scofl* may here denote 'something resembling the hollow blade of a shovel'.
>
> (Cullen 1997, 480–481)

Paraphrasing Cullen, *KEPN* (s.n.) observes: 'such a bird's-eye perspective is unusual in OE topographical qualifiers'. However, unlike locations with names in $_{\text{OE}}$ *dūn*, $_{\text{OE}}$ *clif* can be readily viewed from above, although such a perspective would not be consistent with Gelling and Cole's finding that 'the cliff may be quite small but is none-the-less eye-catching when seen from the river-side' (*LPN*, 153), i.e. looking up at the feature. Equally, a bird's-eye view would not fit the general context proposed for the GCH, that topographical formations

[147] I am grateful to my colleague, Eila Williamson, for originally proposing this element.

functioned as signposts for travellers *across* as opposed to *above* the landscape (Cole 1994, 14; 2011. *LPN*, xvi). The three admissible senses of OE *clif* (Table 4.7) are consistent with an itinerant's viewpoint.

Fig. 4.2. Choicelee LGT (viewed east-north-eastwards from NT 74294 51100) ?< ESc *schule* 'a shovel' [– –] + ESc _*clif_^{2} [– –].

Fig. 4.3. Choicelee LGT (viewed southwards from NT 74549 51692) ?< ESc *schule* 'a shovel' [– –] + ESc _*clif_^{2} [– –].

If $_{\text{ESc}}$ *schule* (< $_{\text{OE}}$ *scofl*) is indeed the specific, Choicelee and Sholden KNT would be the only toponyms thus far to record the cognate terms for 'shovel', although compounds with $_{\text{OE}}$ *scofl* + $_{\text{OE}}$ *brǣdu* / $_{\text{Sc}}$ *shuil-braid* 'shovel-broad', referring to a narrow strip, are attested in both England and Scotland (*EPNE* s.v.; *LPN*, 218; *PNFIF3*, 446; *PNFIF4*, 221).

Fortunately, the topography of this site is peculiar and may tip the balance in favour of a derivation from $_{\text{ESc}}$ *schule*. Projecting into the concavity, below and opposite the curved escarpment upon which the settlement is situated, is a low hill-spur sloping on two sides. The 'point' of this projection has an internal angle of approximately 74°, although a scoop of ground has been removed from the vertex leaving a small hollow (Fig. 4.1). The overall appearance of this spur of land jutting towards the '*clif*' is not unlike the rounded back of a horizontal shovel blade resting with its point on ground. Fig. 4.1 is an aerial view of Choicelee showing these features delineated. The locations from which the hill-spur and escarpment were photographed (Fig. 4.2; Fig. 4.3) are also marked. Although references to agricultural implements are rare in place-names, Choicelee may be an instance of such. Despite uncertainty as to the precise etymology of the specific, the generic element permits *Shollesclif* to be triaged. It achieves ∑=3.0 'proven' for the co-appellative *R*<>•S•.

4.3.7.1 ***Old Crunklaw*** EDR •S• NT 77590 50572

[$_{\text{Sc3}}$ *crunckled* + $_{\text{Sc1}}$ *law*^{1} (*REELS*) or $_{\text{ESc1}}$ **crumb* + $_{\text{ESc1}}$ **clif*^{2} 'escarpment']

Crongle 1545 *Gairdner and Brodie* vol. 20, ii, pp. 199, 248
Crwnkle 1582 *RMS* v no. 403
Crunkley 1654 *Blaeu (Pont) Mercia*
Crunkly 1752×1755 *Roy*
Crunklaw 1771 *Armstrong*
Old Crunklaw 1862 *OS 6" BWK*, XXII

Supplementary to NPSB – Prior to the flooding of Derwent Dale, the current promontory of Cronkley NTB •S• NZ 02095 52449 < $_{\text{OE}}$ *crumbe* + $_{\text{OE}}$ *clif* (*PNL*, 132; *LPN*, 153) was a riverine bank ($_{\text{OE}}$ *clif*[1] – Table 4.7). *Old Crunklaw* EDR stood below a comparable curved feature.

Fig. 4.4. The site of *Old Crunklaw* EDR [O] in the lea of **Crunk Law* **[– –]** (aerial view).

Fig. 4.5. **Crunk Law* EDR (viewed eastwards from NT 77356 50545).

Despite a provisional analysis of $_{\text{Sc3}}$ *cruncked* + $_{\text{Sc1}}$ *law*, a shared etymology with its Northumberland counterpart should be considered. If correct, this would suggest the existence of a hitherto unattested $_{\text{ESc}}$ **crumb* > $_{\text{MSc}}$ *crom*, *crum* 'bent, crooked' *16*– (*CSD2*).

Fig. 4.6. **Crunk Law* EDR (viewed east-north-eastwards from NT 77427 50706).

4.3.7.2 **Wrunklaw** LMS •S• NT 67232 58439

[$_{\text{un1}}$ *?* + $_{\text{Sc1}}$ *law*[1] (*REELS*) or $_{\text{ESc1}}$ **crumb* + $_{\text{ESc2}}$ **clif*[2] 'escarpment']

Cronkle 1528 *RMS* iii no. 635 [the king grants to John Stirling of Keir (*Keire*) and his heirs, the lands and places of Kettelshiel (*Kettilschell*), Horseupcleugh (*Horsopcleuch*), *Cronkle*, Handaxwood (*Handeriswod*), Byrecleugh (*Birecleuch*) and Trottingshaw (*Trotanschaw*), with the lands of the forest of Dye (foreste de *Dy*)]

Croncle 1535 *RMS* iii no. 1481 [the king grants to John Hume, natural son of the late Alexander lord Hume, the lands and places of Kettelshiel (*Kettillschelis*), Horseupcleugh, *Croncle*, Handaxwood (*Handeriswod*), Byrecleugh (*Birecleuch*) and Trottingshaw (*Trottandschaw*), with the lands of the forest of Dye (foreste de *Dy*)]

Cruinkle 1539 *RMS* iii no. 2011 [the king confirms to John Hume, natural son of the late Alexander lord Hume, the lands and places of Kettelshiel (*Kettilschele*), Horseupcleugh (*Horsopcleugh*), *Cruinkle*, Handaxwood (*Handeriswod*), Byrecleugh (*Birecleuch*) and Trottingshaw (*Trottandschaw*), with the lands of the forest of Dye (foreste de *Dy*)]

Wrincleve 1568 *RMS* iv no. 1814 [Granted to Master David M'Gill of Whitchester (*Quhitchester*) 'which came [into royal hands] on account of the forfeiture of James, late/once earl of Bothwell immediate tenant of them - to be returned, one silver penny in name of blench farm just as the said James held them from the king' (*que devenerunt ob forisfacturam Jacobi olim com. de Boithuile, immediate tenentis earundem :- REDDEND. unum den. argenteum nomine albe firme, sicut dictus Jac. eas de rege tenuit*)[148]

Wrounklie 1602 *Retours* (BWK) no. 28 [Thomas Redpath (*Reidpeth*) of that ilk, in the lands of Wrunklaw with mill' (cum molendino)]

Wrunckley 1654 *Blaeu (Pont) Mercia*, •S•

Wrinkley 1698 *Retours* (BWK) no. 473 [Sir Robert Sinclair in various lands including the lands and barony of Longformacus and 'the lands of Wrunklaw with the mill of Wrunklaw' (terris de *Wrinkley* (vel *Winkley*) et molendino de *Wrinkley*)]

Runklie Cairn 1771 *Armstrong*

Runklie 1771 Armstrong, •S•

Wrink Law 1862 *OS 6" BWK*, IX

Wrinklaw 1862 *OS 6" BWK*, IX, •S•

Supplementary to NPSB – This is another instance suggestive of $_{\text{ESc}}$ **clif*. A medieval promontory fort on a hill-spur (NT 67232 58439) of Wrunk Law LMS •R• NT 67717 58925 is the site of this former settlement, which the OS Explorer 1:25,000 show as ruins called Wrunklaw. Williamson (*NPSB*, 53) has reservations over the accuracy of the form *Wrunckley* 1654 *Blaeu (Pont) Mercia*, although it actually appears to preserve the local pronunciation (§4.3.7), as confirmed by Maxwell (1909, 282) 'written Wrink Law, but locally called Runklie'.

NPSB (p. 53) suggests 'the first element may represent an ablaut grade OE *wrinclian* "wrinkle, twist": cf ModSc *runkle*, "to rumple"'. Such a connotation would plausibly describe the curved gully separating the parent hill from its spur, and so 'wrunk-' might refer to either or both features. The past participle $_{\text{OE}}$ *gewrinclode* is attested once referring to a declivity:

[148] *RMS* ii no. 2106 (1492) grants to Archibald Douglas, earl of Angus, a parcel of lands which are united into the free barony of Bothwell (*in unam liberam baroniam de Boithuile univit et incorporavit*): 'terras de *Trottandschaw*, le *Byreclewch*, *Handaxwod*, *Horshop*, le *Hartschawmedow* nuncupat. vulgariter le *Somerschele*, et le *Kettilschele*, in foresta de *Dye*, vic. *Berwik*.' This strongly suggests that *Wrincleve* 1568 and *Cronkle* 1528, *Croncle* 1535, and *Cruinkle* 1539 are variants of the same name. Without separately designating *Cronkle* / *Wrincleve*, *RMS* iv no. 144 (1547) grants exactly the same lands, but also mentions James Douglas, heir to Archibald, earl of Angus, who will have forfeited them by 1568, when *Wrincleve* first appears on record.

'*ðe gewrincloda dīc* 'the winding ditch' (*Bos.-Tol.* s.v.). This usage would support Williamson's suggestion if the sinuous gully at NT 67291 58410 inspired the specific. It is possible that hill and hill-spur were originally separate toponyms with a common specific: the escarpment aspect of the hill-spur viewed from Dye Water giving rise to ESc **clif*[2], whilst the main hill above the settlement was named from ESc *law*.

Alternatively, *-cleve* of the 1568 form could represent OSc *cleuch* (≈ ME *clough*) 'a gorge, a ravine; frequently in place-names *la12*–' (*CSD2* CLEUCH *n.*[1]), although the ubiquity of *cleuch* in other local names would make the substitution of *Wrincleve* with *Wrunckley* somewhat curious when the neighbouring Horseupcleugh NT 66787 58480, just 650 m distant, has preserved its valley-term right through to the present.

The possibility that **Crunk Law* EDR •R• *NT 77651 50600 *R*<>•S• *Old Crunklaw* EDR NT 77590 50572, and **Runkillit clif* (~ Wrunklaw) LMS *NT 67232 58439 *R*<>•S• Wrunklaw LMS NT 67232 58439 could derive from OE *clif* / ESc **clif* will be tested along with other *NPSB1* examples.

4.3.8 ***Witehoh*** CSM •R• *NT 84319 39666 or *NT 86093 41495

OE *hwīt* + OE *hōh* (*NPSB*, 57, 58)
[OE1 *hwīt* + OE1 ***hōh***[1]]

(sororibus de) *Witehoh* c. 28.3.1165×1166 *Coldstream Cart.* no. 11 [C(ospatric) the earl … has given to the sisters of *Witehoh* one ploughgate, half from Lennel and the other half from Birgham.']
(sororibus de) *Witehou* c. 28.3.1165×1166 *Coldstream Cart.* no. 8 [Cospatric the earl … has given to the sisters of *Witehou* in perpetual alms half of Lennel church (dimidiam ecclesie de *Laynall*), half a ploughgate in Lennel and a further ploughgate, half from Lennel and the other half from Birgham.']
St Mary's Abbey (Site of) 1862 *OS 6" BWK*, XXIX

The editor of *Coldstream Cart*. (p. viii, fn. 2) dismisses an earlier claim this place-name was transferred from 'a Cistercian convent at Withow, in England', proposing instead '[t]he name was probably the original description of the spot on which the convent stood'.[149] This inference may well be correct. OS 6 inch 1st edn. map shows the 'abbey' site at NT 84319 39666. However, the topographical feature represented by *-hoh / -hou* may also be preserved in How Dean CSM •R• NT 86052 41736, and its associated burn, just under 0.5 km to north-east of Lennel Church – the object of the bequest. This is the sole record of this name. *BWKR* cautiously offers an etymology of How Dean from the adjective $_{\text{Sc}}$ *howe*, reflecting:

> 'A valley forming a hollow or depression'. From this it might be expected to be quite deep. However, it is described in the OS Name Book as: 'A slight valley through which Howdean Burn flows' (OS1/5/12/13).
>
> *BWKR* (s.n.)

The *howe* in question might conceivably be a noun and correspond to the *Witehoh* / *Witehou* of the charters. Unfortunately, neither at Coldstream nor in the vicinity of How Dean can any relief-feature corresponding to $_{\text{OE}}$ *hōh* be positively identified, although both areas, to the east of Lennel Church and that encircled by the large meander of the Tweed at Coldstream, may, at a stretch, represent $_{\text{OE}}$ *hōh*^{2} 'a low projecting ridge of land in the bend of a river' (Table 4.7). The specific $_{\text{OE}}$ *hwīt* / $_{\text{ESc}}$ *whit* is a multivalent element that can refer to: land left fallow or open pasture; lightness of appearance in the soil or vegetation; areas that are sublet or disputed; dairy produce; boundaries; or the use of stone in the construction of buildings (*PNFIF5*, 530–532), amongst other connotations (*EPNE*, 237, Hough 2003, 83–88). The white surplices of Cistercian nuns may even have played a role.[150] Any of these senses may have inspired *Witehoh* / *Witehou*, but the evidence is lost that would aid identification of the specific relief-feature. Therefore, this important early name must unfortunately be excluded at triage Stage 3.

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[149] Hamilton (2003, 287–289) echoes this conclusion.
[150] This is proposed as one possible motivation for the naming of the Cistercian Abbey of Hendy-gwyn / Whitland CRM <https://en.wikipedia.org/wiki/Whitland>, accessed June 2020.

4.3.9 ***Wyrmsclif*** (Wormerlaw) ECC •S• *NT 75657 40548

$_{\text{?pn}}$ *Wyrm* (≈ $_{\text{pn}}$ *Ormr*) + $_{\text{OE}}$ *clif* (*NPSB*, 58)
[$_{\text{pn2}}$ *Wulfmǣr* + $_{\text{ESc2}}$ **clif*[3] 'small hill or bluff']

Wyrmsclif 1367–8 *CDS* iv, no.140, extracted from (42 Edward III) *I.P.M.*, vol. 12, no. 201 (4). ['Sir Edward of Letham knight, held at his death … the manor and hamlet of *Wyrmsclif* (?), worth 26s. 8d., which he occupied by …. The said manor and hamlet descended by hereditary right, and were formerly held of the Earl of Dunbarre by military service as a knight's fee, paying 40s. to the castle guard of Dunbarre, and giving suit at the Earl's court held at *Ungelstane* thrice in the year; which services now belong to the K[ing, Edward III of England] by forfeiture of Patrick earl of March'][151]
(terras de) *Wormecleif* 1451 *RMS* ii, no. 513
(terras dominicales de) *Wormorlaw* 1605 *RMS* vi, no. 1563 ['the mains lands of Wormerlaw, the mill, multures, and revenue of Eccles' (*molendinum, multuras et proventum de Ecclis*)]
(terras de) *Wormetlaw* 1621 *RMS* viii, no. 130
(terras de) *Wormeworlaw* 1623 *RMS* viii, no. 515
(lie *Maynis de) Wormetlaw* 1630 *RMS* viii, no. 1510
(terras de) *Wormerlaw* 1630 *RMS* viii, no. 1533
Maynes de Wormetlaw 1634 *Retours* (BWK) i, no. 209 ['the mains lands of Eccles comprehending the *Mains of Wormerlaw*, extending to 16 husbandlands, with the mill called *Horsrigmylne,* within the lordship of Eccles' (*terris dominicalibus de Eccles comprehendentibus Maynes de Wormetlaw, extendentes ad 16 terras husbandias, cum molendino vocato Horsrigmylne, infra dominium de Eccles*)]
(terras de) *Worme(r)law* 1635 *RMS* ix, no. 367 ['the mains lands of Eccles comprehending the lands *of Worme(r)law*, extending to 16 husbandlands, and with them the mill called *Horsrigmylne* … within the lordship of Eccles' (*lie Maynes de Eccles comprehend. terras de Worme(r)law, extenden. ad 16 terras husb., cum earum molendino vocato Horserigmylne … in dominio de Eccles*)]
Wormerlaw c.1636×1652 *Gordon* no. 58
(unica parte terrarum de) *Wormerlaw* 1637 *Retours* (BWK) i, no. 222
Wormeworlaw 1648 *Retours* (BWK) i, no. 278 ['the lands and mains lands of Eccles comprehending the lands of Wormerlaw' (*in terris et terris dominicalibus de Ecclis comprehendentibus terras de Wormeworlaw*; etc.')]
Woormerlaw 1654 *Blaeu (Pont) Mercia*
(mains of) *Wermetlaw* 1655 *RMS* x, no. 411
(mains of) *Warnottlaw* 1655 *RMS* x, no. 458
(mains of) *Warmitlaw* 1656 *RMS* x, no. 480
(lands of) *Wormerlaw* 1667 *RMS* xi, no. 1098 ['the lands of *Wormerlaw*, extending to sixteen husbandlands, with the mill thereof, called *Horserigmilne*, and the mill-lands']

[151] The source document is described by the editor as in very poor condition and totally defaced in parts. *Ungelstane* has not been traced and is the only occurrence of that name. It may be a corruption of Whinkerstones FOG, or perhaps Angelrow GRE. Hamilton (2003) has no comparable place-name in her thesis, which details the activities of the Earls of Dunbar to c. 1289.

Maynes de Wormetlaw 1669 *Retours* (BWK) i, no. 357
Wormer Law •R• (no buildings shown) 1752×1755 *Roy*
Wormerlaw 1771 *Armstrong*
Wormer law •S•1826 *Greenwood*
Wormerlaw 1862 *OS 6" BWK*, XXVIII

Pratt (2005, 99) believes *Wyrmsclif* is Wormerlaw ECC, but Williamson (*NPSB*, 58) more cautiously suggests it could lie 'near Wormerlaw with which there may be some connection'. Equating these names is not unreasonable given other substantial land-holdings in Eccles can be accounted for across the fourteenth to seventeenth centuries, but *Wyrmscl(e)if* disappears after 1451 and Wormerlaw (*Wormorlaw*) is unknown before 1605.

A comparison of the documents recording the forms *Wyrmsclif* (1367–8) and *Wormecleif* 1451 reveals a small overlap of lands in each portfolio (highlighted below). Given their wide distribution across the county this appears to indicate a pattern of association rather than mere chance and suggests *Wyrmsclif* and *Wormecleif* could be the same settlement:

***CDS* iv, no.140 (1367–8)**	***RMS* ii, no. 513 (1451)**
Letham (Leitholm ECC)	*Hershope* (?Hareshope YES)
Ketilscheles (**Kettelshiel** LMS)	*Aldhamstokkis* (Oldhamstocks OHS)
Wyrmsclif (?**Wormerlaw** ECC)	*Colbirnspeth* (Cockburnspath CBP)
Derchester (Darnchester CSM)	*Kettilschele* (**Kettelshiel** LMS)
Little Swynton (Little Swinton SWN)	*Whitesom* (**Whitsome** WHI)
Horneden (Horndean LKK)	*Mersyntoune* (Mersington ECC)
Whitesom (**Whitsome** WHI)	*Wormecleif* (?**Wormerlaw** ECC)
Hilton (WHI)	*Rollandstoune* (*Roweston* ECC)[152]
	Lambden (GRE)
	Quhinkerstanis (Whinkerstones FOG)

Wyrmsclif is described as a manor and a hamlet. *Wormorlaw* (1605 *RMS* vi, 1563) has been identified as the probable monastic grange of the Cistercian nunnery at Eccles (Hall

[152] Formerly at NT 74539 45598.

2002, 38). The 1634 extent of *Wormeworlaw* at 16 husbandlands equates to c. 416 acres (Barrow 2003, 184), which would require some 24–32 households to cultivate it (Dickinson *et al.* 1958, 218). Comparison of these facts regarding size and importance presents no obstacle to considering these names as referring to the same landholding, although confirmation is wanting due to an absence of historical forms for the crucial period 1451–1621.

Interestingly however, when the modern name does emerge in the seventeenth century we observe oscillation between forms in *Wormetlaw*, *Wormeworlaw*, and *Wormerlaw*. The intermittent *-t-* could represent an attempt to reanalyse **Worme(r) clif* (?< pn *Wulfmǣr*) as **Wormod Law* /ˈwʌrmədLi/ with 'fronting' of /k/ to a dental as ESc **clif* merges with the more familiar element Sc *law*, locally /Lɪ/ in unstressed syllables[153] The substituted specific might have been made plausible by the presence of Sc *wormewod, wormot* 'wormwood' *Artemisia absinthium* (*DOST*) growing, or believed to have been grown, at this site. In Berwickshire, this plant is classed as a rare botanical archaeophyte i.e. a species introduced by human activity in the non-recent past. Wormwood has not been recorded at Wormerlaw, but the existence of a historical colony of this plant on Coldingham Law has been attributed to its cultivation for medicinal purposes by Coldingham Abbey (Braithwaite 2004, 23). If wormwood has ever flourished at Wormerlaw, the proximity of the nunnery at Eccles suggests a possible parallel.[154] The case is intriguing but unproven.

Turning to the generic element, the two main senses of OE *clif*, 'steep escarpment' (*n.*[2]) and 'river-bank' (*n.*[1]) do not suit the local topography. But, Wormer Law ECC •R• NT 75583 40531 would conform well to the third sense denoting 'small hills or bluffs'

[153] See the discussion of *Shollesclif* (Choicelee LGT – §4.3.7).
[154] The same element may occur in Wormit FGN and its associated hill (*PNFIF*4, 441–442), some 4.3 km from Balmerino Abbey, which like Eccles was a Cistercian foundation. Apart from its use in medicine, wormwood can substitute for hops in the production of beer, so its incidence in the modern landscape, and in place-names relative to medieval religious centres, may be not be accidental.

(*PNL*, 130), which are salient in their locality, located inland, and possibly quite short and otherwise unimposing (*LPN*, 153). In applying this sense of OE *clif* to Wormer Law, as a development from *-clif*, it is important to note a difference between the new edition of *LPN*, which harks back to *PNL*, and the 2000 edition. *VEPN* (s.v.) reaffirms the 2000 definition: 'concluding that a 45° or steeper angle of slope seems to be the defining factor; more gradual inclines […] are typically given by *helde*.' However, Ann Cole (personal communication, May 2020) has since clarified this apparent ambiguity:

> When Shaun Tyas was resetting the text of *LPN* for the 2014 edition he gave me the opportunity to make some minor revisions and that is why the entry for *clif* is different. If you look at the sketches, or the photos on the SNSBI website, you can see that many of the *clif*s are not as steep as 45 degrees (that's 1 in 1!). […] Neither Margaret [Gelling] nor I have written on this revised definition of *clif*. I revised the entry on the basis of personal observations in the field and the improbability of such an exact angle of slope as 45 degrees (or any other number) being measured or recognised in A[nglo]-S[axon] times.

Fig. 4.7. Wormerlaw ECC (viewed south-south-eastwards from NT 75271 41168).

The rationale for this updated definition is presented here from the co-author of the GCH so that the 2000/2003 definition, cited in *VEPN*, can be evaluated in context. The current study accepts this revised definition of $_{\text{OE}}$ *clif*^{3} (Table 4.7) and believes Wormer Law ECC offers a good example of this sense. Pratt struggles to square the 2003 GCH definition with observation in the field:

> Wormerlaw (BWK) *Wyrmsclif* 1367–68 […] is on one of the highest, most marked slopes in this relatively flat area, set on a ridge with very steep slopes that are now the farm's front and rear driveways. Though steep, however, neither slope exceeds 45 degrees.
>
> (Pratt 2005, 99–100)

This difficulty is resolved, however, by recourse to Ann Cole's more nuanced definition. *DOST* has no entry for $_{\text{ESc}}$ **clif*, but potentially *Wyrmsclif*, and more probably *Shollesclif*, demonstrate this rare element evolved from Old Northumbrian in Scotland and was current in Berwickshire place-names up until at least the mid-fifteenth century.

With regard to the as the specific element, *REELS* favours a personal-name in *-mǣr* to account for the medial *-er-* of the early forms. $_{\text{pn}}$ *Wulfmǣr* is a possibility. Three doublets of *Wyrmsclif* are known; the general consensus being that the specific in these represents $_{\text{OE}}$ *wyrm* 'snake, dragon, reptile'.[155] This recalls a local twelfth-century dragon-slaying legend, the 'Worm of Linton' (Somerville 1815 i, 38–46), the reputed setting for which lies 11.8 km south-southeast of Wormerlaw at *Worme's Glen* ROX (Worm's Hole LIN •R• NT 79031 29221). Although identification of *Wyrmsclif* with Wormerlaw is not conclusive, the balance of probability allows it to be triaged and compared with other names in $_{\text{OE/ESc}}$ *clif*^{3}. It achieves ∑=2.5 'very probable' for the co-appellative *R•<>•S•.

---

[155] Onecliffe Mill YOW < $_{\text{OE}}$ *wyrm* + $_{\text{OE}}$ *clif* (*Wormeclif* 13th; *Wormecliffrodes* 1356 'reptile or dragon bank' – Smith 1961b, 47); *Wormecliff* YOW < $_{\text{OE}}$ *wyrm* + $_{\text{OE}}$ *clif* (*Wormecliff* 1426; *castr' de Wornecliff* 1487 – Smith 1961a, 262); Wormcliff WLT < $_{\text{OE}}$ *wyrm(a)* + $_{\text{OE}}$ *clif* (*la Wormeclyve* 1274; *Wornyclive* (sic) 1332; *Wormecliffes mede* 1558; *Wormecliffe* 1629 – Gover *et al.* 1939, 85; xxxix–xl).

NPSB1 (*Appendix C*) summarizes an application of the triage stages to the nine *NPSB* toponyms that are additional to REELS1 thus far. Five were eliminated and returned to NPSB2 before reaching triage Stage 5. The remainder achieved ∑≥2:0 and so could be added to BWK1. _*Swar(d) dūn_ (?> Redbraes [Castle]) PWH (q.v.), with a co-appellative of *R*<>^{u}S^{u} was added to BWK2, despite a ∑=1.0, as explained previously (§4.3.6.1).

Significantly, this review has demonstrated an additional early hill-term, $_{\text{OE/ESc}}$ _*clif_, is evidenced in Berwickshire with the senses ' steep escarpment' (*n.*^{2}), and 'a small hill or bluff' (*n.*^{3}). This element, although postulated by Williamson and Pratt, was not investigated further. As well as *Shollesclif* LGT and Wormerlaw ECC, two additional toponyms, already under investigation for $_{\text{Sc}}$ *law*^{1} (REELS1), will also be tested for $_{\text{OE/ESc}}$ _*clif_: *Old Crunklaw* EDR •S• NT 77590 50572 and *Wrunklaw* LMS •S• NT 67717 58925, for which additional rows will be created in BWK1.

4.4 'Breaking Old and New Ground: A Comparative Study of Coastal and Inland Naming in Berwickshire' – data

In the preparation of *Appendix One* of her thesis, Dunlop used Microsoft Excel to create a spreadsheet of the place-names and *referenced points* (places marked on a map, which are not names, e.g. *Pile of Stones* CBP NT850691) of four contiguous Berwickshire parishes (*BONG* i, 92).[156] That dataset runs to 2,941 rows and 58 columns with toponyms categorized into 761 *base names* 'those names first coined that relate directly to a topographical feature' (*BONG* i, 89–90) and 414 *derived names* 'derivatives' (§4.2.1.6). By their nature, reference points and derivatives are not suitable to test the GCH and so must be set aside. Of the remaining 761 base names, 263 were identified as containing potential

[156] I am grateful to Leonie Mhairi Dunlop for kindly supplying and permitting my use of this spreadsheet.

hill-terms. These were extracted and compared against data for the corresponding four parishes in a copy of BWK3. Duplicates were identified and transferred to a second dataset of inadmissible names, BONG2. In each case, the reason for elimination is noted in the column 'Returned from BONG1'. The remaining corpus of 234 head-names, BONG1 (provisional), thus comprises only those place-names additional to BWK3. Where possible, *BONG* ascribes a six-digit NGR to every head-name. However, that NGR is occasionally reduced here to four-digits if the locus is judged to be more speculative. Reconstructed NGRs are prefixed with an asterisk as usual. The impossibility of identifying very accurate locations for rare and lost names in early charters means that some potentially valuable toponyms cannot be utilised. With reluctance, these must be relegated to BONG2. Nevertheless, a concerted effort has been made to locate all relief-features and their co-appellative settlements.

BONG1 and BONG2 were also compared with REELS2 and NPSB2 to ensure any name variants, previously judged inadmissible to the final Berwickshire dataset, had not been erroneously re-included or renamed places left unlinked to obsolete names (§4.2.1.5), e.g. *Outlaw Hill* (> Oatlee Hill) CHM, and *Potts Hill* (> Paits Hill) CBP. Such laborious checking and cross-checking is essential to confidently ascribe a ten-digit NGR to every head-name ahead of triage.

Two examples of early names will be examined in the following sections: Hogslaw Knowe CBP (with a trio of associated early thirteenth-century settlements: *Oggeslaudale*, *Dailing*, and *Heseldale*, which together may help solve a toponymic riddle), and *Schitenhogesbelle* CHM. Etymologies in square brackets are revisions of those offered by *BONG*.

4.4.1 ***Hogslaw Knowe*** CBP •R• NT 80100 70114

$_{\text{pn1}}$ *Ogga* + $_{\text{Sc1}}$ law + $_{\text{SSE1}}$ *knowe*^{1} (*BONG* i*,* 104, 133)
[$_{\text{en1}}$ **Hogs Law* + $_{\text{SSE1}}$ *knowe*^{1}]

~ *Oggeslaudale,* e13 Raine, *ND*, App. no. CLXXIX
Hogslaw Knowe 1857 *OS 6" BWK*, I
Hogslaw 1900 *OS 6" 2nd BWK*, I, SE sheet
Hog's Law 1909 *OS 6" 2nd ELO*, XIII, SW sheet

This relief-feature is shown as Hog's Law on current OS maps. *BONG* (i, 104) connects Hogslaw Knowe / Hog's Law with the early thirteenth-century *Oggeslaudale* (*ND*, App. no. CLXXIX) – a suggestion first made by antiquarian, James Hardy of Penmanshiel CBP (Hardy 1872, 411), whose property lay adjacent to the hill.[157] *OSNB*, in its survey of 1856–1858, describes *Hogslaw Knowe* as:

> A small mound or knowe in a field on the farm of Townhead. Some years ago there was a tumulus on its summit from which a stone coffin was taken when trenching and leveling [*sic*] the ground.
>
> (OS1/5/8/48)

Fig. 4.8. The remains of *Hogslaw Knowe* CBP (viewed north-westwards from NT 80134 70095).

[157] Hardy is cited as an *OSNB* authority for Hogslaw Knowe and 273 other Bunkle and Preston, Cockburnspath, and Coldingham entries. See <https://en.wikipedia.org/wiki/James_Hardy_(naturalist)> for a biographical sketch.

Together with his neighbour, Mr J. Hood of Townhead, also an *OSNB* authority for this relief-feature, Hardy undertook a second 'excavation' of the tumulus on 10 June 1872. Although both assert *Hogslaw Knowe* to be the correct form in 1856–1858, Hardy omits *Knowe* from the name in his 1872 Berwickshire Naturalist's Club article on it. From 1900, *Knowe* disappears from OS maps and *Hogslaw* becomes Hog's Law, the current name. Prior to its partial destruction c. 1842 (Hardy 1872, 411), it appears *Hogslaw Knowe* was a diminutive hill, perhaps partially artificial, although Hardy, in contradiction of the earlier (?his own) *OSNB* description, states:

> Previous to being in culture, this hill-top was covered with grass. […] This hill itself is of the tumulus form. Gravel knolls, in many instances, in this district have been selected as prehistoric sepulchres; and I am not aware that in these cases there existed any artificial barrow.[158]
>
> (Hardy 1872, 411–412)

The nature of the feature is relevant to verifying its name. The use of OE *hlāw* in the context of artificial mounds is not attested north of 'a vague line from the Mersey to the Humber' (*LPN*, 178–180), and this appears to be true also of ESc *law*; the application of MSc *law* to artificial hills is undocumented before the late sixteenth century (*CSD2* LAW^3 *n*.^{2}). Furthermore, OE *cnoll* and its later reflex Sc *knowe* never refer to tumuli (*VEPN*; *OED2*; *DOST*). Instead of functioning epexegetically, *knowe* suggests perhaps a small, ostensibly natural hill differentiated from yet associated with another feature called **Hogs Law*. The most obvious candidate being the 216 m hill at NT 79752 69267, which although it dominates the district is unnamed on maps. *Hogslaw Knowe* stands upon the north-eastern foot slope of this **Hogs Law*, the western face of which has been called **Aikie Side* since at least the mid-twelfth century (1165×1171 *ND*, App. nos. XLV, XLVI). Derivatives of that name are well documented.[159] Therefore, although inconclusive, *Hogslaw Knowe* seems

[158] The value of Hardy's archaeological opinions should be weighed against the typical methods and motivation of the era, which resemble tomb raiding: 'the broken-off point of a leaf-shaped flint arrow-head […] was the only reward we had' (Hardy 1872:411).

[159] For example, *Aikieside Wood* CBP •V• NT792692, renamed Penmanshiel Wood on OS maps since the 1950s.

itself to be a derivative name that acquired the appearance of an original coining during the period 1858–1900 due to the loss of its secondary generic (§4.2.4). But, what if any is the connection to *Oggeslaudale*?

4.4.1.1 *Oggeslaudale*, *Dailing*, and *Heseldale*

$_{\text{pn}}$ *Ogga* + $_{\text{OSc}}$ law + $_{\text{OSc}}$ *dale* < $_{\text{OE}}$ *dal* [*dāl*] 'portion of land' (*BONG* i, 104, 133, 222; ii, 121, 371)
[$_{\text{pn1}}$ *Ogga* + $_{\text{ESc1}}$ *law*[1] + $_{\text{ESc}}$ *dale* < $_{\text{OE}}$ *dæl* 'valley'][160]

Oggeslaudale, *e13* Raine, *ND*, App. no. CLXXIX ['in Hogslawdale at the grove an acre' (*in oggeslaudale apud nemus acram*)]
~ *Hogslaw Knowe* 1857 *OS 6" BWK*, I

$_{\text{OSc}}$ *dailing*, *daling*, 'division or portion of land' (*BONG* i, 107; ii, 100, 371)[161]
[$_{\text{ESc1}}$ *dale* < $_{\text{OE}}$ *dæl* 'a valley, pit, hollow' + *-ing*[2] (*EPNE*, 288) 'the place pertaining to gullies']

Dailing, *e13* Raine, *ND*, App. no. CLXXIX ['under Dailing one and a half roods' (*sub dailing rodam et dimedietatem*)]

$_{\text{OSc}}$ *hesel* + $_{\text{OSc}}$ *dale* < $_{\text{OE}}$ *dal* [*dāl*] 'portion of land' ?or < $_{\text{OE}}$ *dæl* 'valley' (*BONG* i, 106; ii, 249, 371, 372)
[$_{\text{ESc1}}$ *hesel* + $_{\text{ESc1}}$ *dale* < $_{\text{OE}}$ *dæl* 'valley']

Heseldale, *e13* Raine, *ND*, App. no. CLXXIX ['in Heseldale an acre' (*in heseldale acram*)]

Determining the origin of the final element in *Oggeslaudale* could help locate both it and **Hog's Law*. *BONG* (i, 104) proposes an etymology of $_{\text{pn}}$ *Ogga* + $_{\text{Sc}}$ *law* + $_{\text{Sc}}$ *dale* 'a portion of land' (*DOST* DALE[2] *n.*[2]) and nominally locates this at *Hogslaw Knowe* (NT 80100 70114), with

[160] *BONG* (i, 104) suggests: '*Ogga* is a personal name, possibly the same *Ogga* who was "a witness to King Eadgar's [sic] charter of Swintun to the monks of St. Cuthbert of Coldingham"' (i.e. 1095×8 January 1107 Raine, *ND*, App. no. IV). Two glimpses of his possible son are: a sale of Coldingham lands lying 'next to the croft of Eilaf, son of Oddger' (*et iuxta croftum eilaf filii ogge* – ×1203 Raine, *ND*, App. no. CCLXV), and a charter of 1182×1198 (*ND*, App. no. CCCLXXXVIII) is witnessed by the same man. *POMS* (after Insley) suggests *Ogga* is an Old English hypocoristic form of $_{\text{pn}}$ *Ordgar*, <https://www.poms.ac.uk/record/person/535/>.
[161] The *DOST* definition 'division or portion of land' (DALING *vbl. n.*[1b]) is unattested before 1633, which would make an early thirteenth-century occurrence remarkable.

the other two names from the same charter (*ND*, App. no. CLXXIX) judged to share the same generic: *Dailing* (*NT 80789 70133), and *Heseldale* (*NT 81401 70113).[162] *BONG* (i, 107) suggests the first is 'another spelling of *daling*, "a division or portion of land" (*DOST* s.v. *daling* vbl. n.)', whilst *Heseldale* might relate to either Hazel Dean CBP •R• NT 78187 70805 or *Hazeldean Burn* CBP •W• NT 81401 70113. The last is shown on the OS 1st edn. map renamed as Redheugh Burn below its confluence with Old Cambus Burn (< *Boonsdean Burn* 1857 *OS 6" BWK*, I). Together with other parcels of land in the same charter, *Heseldale* is described as lying 'in the (open) field of Old Cambus' (*terre in campo de Ald<e>chamb<us>*). The area to the immediate west of Old Cambus is bisected by the deep gorge of Pease Dean and its burn, so it seems improbable that a medieval open field would extend to include lands across such a major natural boundary and yet be considered part of the same open field. If this is accepted, Hazel Dean CBP •R• NT 78187 70805 can be ruled out as *Heseldale*, leaving *Hazel Dean* (~*Hazeldean Burn*) as the most likely candidate. In fact, although named on maps, *OSNB* records: 'Hazel Dean is the name of the hollow through which the [Hazeldean] Burn flows but it is too insignificant to be shewn' (OS/1/5/8/53).

The location of *Oggeslaudale* is equally not straightforward. *BONG* observes: 'In this area, it appears that *dene* is usually used to denote a valley, while *dale* denotes a portion of land' (p. 106), i.e. *dene* < $_{\text{OE}}$ *denu*, whilst *dale* < $_{\text{OE}}$ *dāl*. Although Dunlop concedes the modern names, Hazel Dean and *Hazeldean Burn*, could represent a substitution of $_{\text{OE}}$ *denu* for $_{\text{OE}}$ *dæl* 'a valley, pit, hollow', she prefers a derivation from $_{\text{OE}}$ *dāl* for *Heseldale*:

> A further possibility is that *Heseldale* is a portion of land beside Hazeldean, a name unrecorded in early sources. This appears the most likely explanation as there are other *dale* names close by in the same charter which denote portions of land.
> (*BONG* i, 106)

[162] These NGRs derive from *BONG*, Fig. 4.2.

Unfortunately, this is something of a circular argument. The etymologies of neither *Oggeslaudale* nor *Dailing* have been securely derived from OE *dāl*. A less complex solution would be *Hazel Dean* NT 81401 70113 < *Heseldale* 'hazel valley'. Notwithstanding *Heseldale* predates the earliest attestation of ESc *hesill* 'hazel' by two centuries, MSc *dale* 'a portion of land' is unrecorded before 1460 (*DOST* DALE^{2}, *n*.^{2}).[163] In the case of *Hazel Dean*, it seems probable that generic substitution occurred between the thirteenth and early seventeenth centuries as Sc *dean* displaced OSc *dale* 'valley' in the lexicon. If accepted, this has implications for the interpretation of *Dailing* and *Oggeslaudale*. However, as all three names are unknown outwith *ND*, App. no. CLXXIX, circumstantial evidence is the best that can be offered for the present. The preposition used before the first name is curious and may be significant: 'under *Dailing* one and a half roods [of land]', the implication being this parcel of land lies beneath *Dailing* – a place located at a higher altitude. Within a kilometre of Old Cambus (NT 80518 69559), there existed a conspicuous landmark called Dean Castles (NT 80770 70532), described as:

> The southern end of an elongated hillock formed between two deep gullies in the hillside below Old Cambus West Mains was adapted to build a promontory fort, but the greater part of the interior had been destroyed by quarrying before 1954.
>
> (*Hillforts*, ID: SC4114)[164]

The plurality of Dean Castles is unexplained – there is only one fort – and Hardy *et al.* are silent on the matter (*OSNB* OS1/5/8/48), although the antiquarian does provide the only eye-witness description of the monument before its gradual destruction:

> Nearly in the middle of the dean, environed on two sides by precipices, and jutting out like a peninsula into the ravine, is a British camp with double ramparts and ditches on the north side, where it lies on the flat. The access is from the south side, up a steep ledge of rock, not passable by carriage ; but the olden people alleged that the Fairy Queen duly ascended it at nightfall in a coach drawn by six horses, thus connecting the fairies with the vanished camp occupants.
>
> (Hardy 1887, 161)

---

[163] *CSD2*, published after *BONG* was completed, has not amended this terminus post quem in its revised entry for DALE$^{1.1}$, *n*.^{3}.

[164] <http://hillforts.arch.ox.ac.uk/records/SC4114.html>, accessed July 2020.

There is a second gully to the immediate west. If this is a genuine Old Northumbrian coining, *Dailing* might represent $_{\text{OE}}$ *dæl* 'a valley, pit, hollow' + *-ing*^{2}. Smith devotes no fewer than 16 pages to the examination of this highly problematic suffix, which if present in this place-name is likely to convey a collective sense (*EPNE*, 288), i.e. 'the place pertaining to gullies'. *Dail-* might more tenuously represent an unrecorded Brittonic element (*EPNE*, 289). Circumstantially then, *Dailing* could provide a lost name for either *Dean Castles*, which appears to parallel the displacement of $_{\text{ESc}}$ *dale* by $_{\text{MSc}}$ *dean*, or it might be the former name of Old Cambus West Mains (NT 80412 70304).[165] The topography, before quarrying, did present a situation where 'one and a half roods of land' could readily be described as lying *under* or *beneath*.

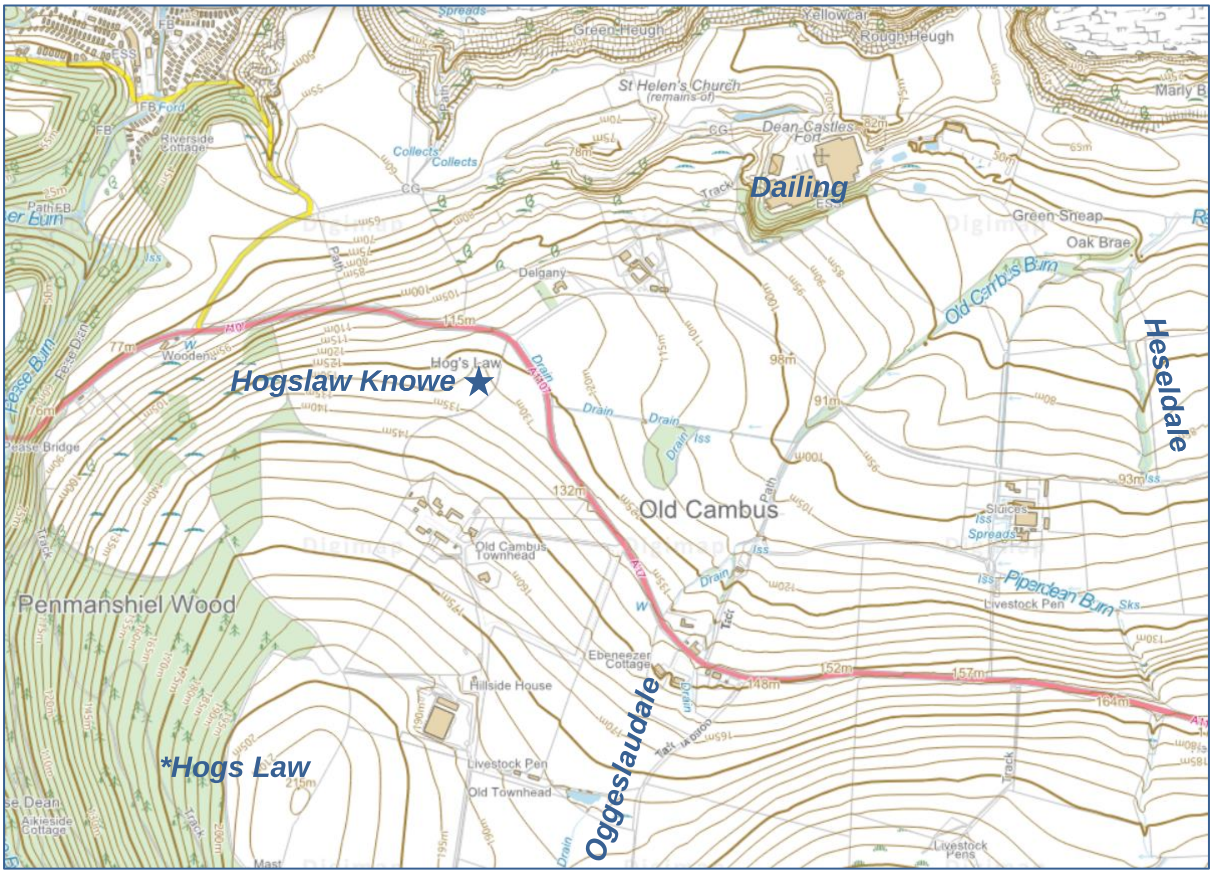


Fig. 4.9. *Hogslaw Knowe* CBP and lands gifted in *ND*, App. no. CLXXIX.[166]

[165] If a renaming, there is a possibility Old Cambus East Mains •R• NT 81179 69783 is the lost *Heseldale*. The name of a new dwelling (Hazel Dean), constructed adjacent to the farmhouse, suggests perhaps the older name never disappeared entirely or else it was coined anew from nearby Hazeldean Burn.

[166] © Crown copyright and database rights 2021 Ordnance Survey (100025252), original scale 1:10,000. Version in Roam: April 2021, using: EDINA Digimap Service, <https://digimap.edina.ac.uk>, accessed 14 November 2021.

If these suggestions do not create too high a house of cards, then *Oggeslaudale* may now be re-interpreted as $_{\text{pn}}$ *Ogga* + $_{\text{ESc}}$ *law* + $_{\text{ESc}}$ *dale* (<$_{\text{OE}}$ *dæl* 'valley'). The valley (NT 80160 69061) lies between the unnamed hill, argued to be **Hogs Law*, and Greenside Hill (NT 80876 68856). This interpretation of *Oggeslaudale*, *Dailing*, and *Heseldale*, on the basis of topography, 'ghost' names, and the chronology of elements, would locate all three approximately 1 km from Old Cambus, which is here assumed to have developed near the centre of an extensive medieval open field (Fig. 4.9).

The foregoing discussion shows that the rare availability (in a Scottish context) of early charter material can considerably revise the date horizons of elements and often the locations inferred from them. One final example from *BONG* illustrates this well.

4.4.2 ***Schitenhogesbelle*** CHM •R• NT 83861 66159

(bird dung) + $_{\text{Sc}}$ *heugh* + $_{\text{Sc}}$ *bell* (*BONG* i,143–144, 150, 211, 250–251; ii, 181, 384, 386, 389)
[$_{\text{ESc1}}$ *schit* + $_{\text{ESc1}}$ *huch*^{3} + $_{\text{ESc}}$ *bell*^{1}]

Schitenhogesbelle ×1203 Raine, *ND*, App. no. CCLXV ['and Bell Hill' (*et schitenhogesbelle*)]
Schytenhoubelle 1255×1281 Raine, *ND*, App. no. CCLXXIX
Schytenhowebelle 29 December 1280 Raine, *ND*, App. no. CCLXXIII ['in exchange for six other acres of land lying at Bell Hill' (*in exchambium pro sex aliis acris terre iacentibus apud Schytenhowebelle*)]
Bell Hill 1782 *RHP*43284
Bell Hill 1855-56 *OS 6"* BWK, V

~*Shittenheugh* 1752×1755 *Roy*
~*Shittenheugh* 1782 *RHP*43284
~*Shittenheugh* 1785 *Ainslie*
~*White Heugh* 1855-56 *OS 6" BWK*, V

Schitenhogesbelle, attested in three thirteenth-century charters, is confidently identified as Bell Hill CHM •R• NT 83861 66159 (*BONG* i, 143, 250). Interestingly, this relief-feature is an example not only of an early derivative, but also the primary referent **Schiten hoge* (CHM •C• NT 91887 68032) has been bowdlerized to White Heugh, and the secondary generic, shorn in this case of its specific and primary generics, has gone on to have a career as a new specific (Bell Hill). And importantly, this early name also bridges a chronological gap in the evidence for $_{\text{ESc}}$ *bell*; the later elements, $_{\text{Sc}}$ *bell* and $_{\text{SSE}}$ *bell*, are well attested and so too is the earlier $_{\text{OE}}$ *belle*, the cognate of which, $_{\text{ON}}$ *bjalli*, is used of hills in Norway and Iceland (*LDPN*, 389).[167] The distribution of this hill-term, far beyond any likely influence from Old English naming conventions, confirms the need to investigate the GCH as an international linguistic phenomenon (§2.2.6).

Triage Stages 1–5 were applied to BONG1, resulting in a final dataset of 55 head-names and 57 rows (*Appendix E*). BONG2 (*Appendix F*) comprises a final dataset of 180 inadmissible head-names.

4.5 *The Place-Names of Berwickshire* – data

Given the unreliability of Johnston's research already discussed (§3.2.1), any data extracted from *PBWK* will be treated simply as a starting point for further investigation. To avoid the necessity of following up every inference and proposed etymology, *PBWK* is considered last in the sequence of augmenting BWK1, BWK2, and BWK3 from previous studies of Berwickshire names, and used only as a final check to ensure those corpora are as complete as possible. In contrast to the other sources examined in this chapter, a different procedure will be followed in identifying which place-names are additional and admissible for triage.

[167] This name also revises the previous earliest attestation of $_{\text{OSc}}$ *schit* 'excrement, dung' from *la16–* (*CSD2*) to *e13–*.

Initially, the 684 place-names of *PBWK* were created into the dataset PBWK1. Of these, 102 were found to have been included in REELS1, and 305 in REELS2. Thus, 407 names that had already been considered could be transferred to create the dataset PBWK2. Further comparison of PBWK1 with NPSB1 and BONG1 eliminated an additional three and two names, respectively. This left 272 *PBWK* place-names to be examined in detail. However, as previously indicated, to engage with this material is not a straightforward matter. Since it can be difficult to relocate specific place-names in the volume, especially if they appear only in the *Introduction* or head-name discussions, PBWK1 and PBWK2 include *PBWK* page numbers for every dataset row.

Of the 272 place-names unique to *PBWK*, most could be eliminated and transferred to PBWK2 for the following reasons:

27	lie outwith Berwickshire (two of which may very doubtfully lie within the study area)
95	cite no sources, nor could they be traced despite investigation
7	do not appear in the sources cited
3	are cited in sources that cannot be traced
115	do not appear to contain hill-terms, of which 97 cannot be located
20	appear to contain hill-terms, but cannot be located
1	appears to be a derivative name.[168]

PBWK flags head-names it considers obsolete with '†', and this symbol has been retained as an expression of Johnston's opinion in PBWK1 and PBWK2. All names flagged as obsolete along with any known or suspected to be 'lost' have been italicized, although this differentiation remains incomplete due to the constraints of identifying sites and checking references for the sources indicated. Ultimately, just four *PBWK1* head-names (five rows) remain to be triaged. Additional research was necessary in each case to allow new etymologies to be prepared.

[168] The PBWK2 column 'Returned from PBWK1' records the reason(s) for elimination in each case.

4.5.1 ***Bitrigsyde*** SWN •S• NT 82278 48194 $_{en1}$ *Bitterig* + $_{Sc3}$ *side*^{2} (*PBWK*, 21).

Bettryckside 1545 *Gairdner and Brodie* vol. 20, ii, p. 199
Bettrikeside 1545 *Gairdner and Brodie* vol. 20, ii, p. 248
Bitrigsyde 1654 *Blaeu (Pont) Mercia*
Bitter rig 1752×1755 *Roy*
Betrigside 1770 *NLS Acc.4282*
Bitterigside 1771 *Armstrong*
Bitterigside 1797 *Blackadder*
Betrigside 1802 *Land Tax* BWK vol. 5, p. 55
Bitterigside 1812 *Ainslie*
Betrigside 1817–1827 *Land Tax* BWK vol. 6, p. 38
Bitterigside 1821 *Ainslie*
Bitterig Side 1826 *Greenwood*
Bitterigside 1841 *Census*
Bitterig Side 1843 *Crawford and Brook*
Bitterig Side 1845 *Fowler*
Bitterickside 1851 *Census*

This name apparently contains two hill-terms and as usual each is assigned an individual spreadsheet row to allow for separate analysis. The stability of *-side* in the historical forms suggests a relationship of **Bitter Rig* •R• to *Bitterigside* •S•. Its proposed etymology from $_{Sc}$-*side*^{2} is inadmissible for corpus inclusion.

Modern OS maps do not offer a clear location for **Bitter Rig*, but the Ordnance Survey 6 inch 2nd edn. map shows the former boundaries of *Bitterigside* •S• (the name is not shown), situated on the spine of a slight ridge-spur narrowly separated from Green Riggs •R• to the east (NT 83235 48244, NT 83730 48372).[169] Although $_{en1}$ *Bitterig* + $_{Sc3}$ *side*^{2} is inadmissible to the corpus, the reconstructed $_{Sc1}$ *bitter* + $_{Sc1}$ *rig*^{1} for the relief-feature can be triaged and achieves ∑=2.0 'probable' for the co-appellative *R*<>^{u}S^{u} – there being no **Bitterig* •S•.

[169] *Fowler* (1845) clearly shows the location of the settlement.

Fig. 4.10. *Bitrigsyde* SWN (viewed west-north-westwards from NT 82720 48030).

Fig. 4.11. Green Riggs$_1$ SWN (viewed east-north-eastwards from NT 82754 48034).

4.5.2 ***Rushlaw House*** CHK •S• NT 45144 52468 $_{\text{Sc1}}$ *rashie* + $_{\text{SSE1}}$ *law*^{1} (*PBWK*, 14, 39)

Rashy Law house 1752×1755 *Roy*
Rushlaw House in ruins 1771 *Armstrong*
Rushlawhouse 1797 *Blackadder*
Rushlaw Ho. 1807 *Arrowsmith*
Rushlawhouse 1812 *Ainslie*
Ruslawhouse (sic) 1821 *Thomson*
Rushlawhouse 1821 *Ainslie*
Restlaw House in ruins 1826 *Greenwood*
Restlaw House in ruins 1845 *Fowler*
Resting House (in ruins) 1854×1862 *OS 6" BWK*, XIII

'Lushlaw House' is Johnston's rendering of the name. References to this remote former hostelry, located in the westernmost corner of Berwickshire, are the only evidence for the name of the hill upon which it stood. Today the ruins are surrounded on three sides by the Toddle Burn Windfarm, a derivative of Toddle Burn CHK STO •W• NT 42909 50107 (§4.5.4).

Rushlaw House itself is clearly a derivative of **Rush Law* CHK •R• NT 45132 52499, whereas the prerequisite of co-appellatives is contemporaneous naming. This raises the issue of how to code a relief-feature for which the location and name are only inferred from a (documented, named, and located) settlement (*R*<•S•), but where contemporaneity of naming is impossible because the relief-feature is the primary referent. The solution adopted here is to treat examples such as **Rush Law* as singleton relief-features at triage Stage 3, since their code would have been •R•<>^{u}S^{u} had a settlement not subsequently been founded. This underscores the fact that despite the format of singleton codes there is no co-appellative settlement (^{u}S^{u}) present, although in this case there is a derivative one. The value of singleton names is the breadth of connotations they can offer for identical hill-terms. *CSD2* (RASH *n.*^{1}) notes the proposed specific, $_{\text{Sc}}$ *rashie* 'overgrown with rushes', has been current only since the nineteenth century, but, if the identification here is accepted, the depth of time for that adjective would be extended back to the mid-eighteenth century at least. **Rush Law* could be triaged for $_{SSE1}$ *law*^{1} and achieved a ∑=2.0 'probable' for the co-appellative •R•<>^{u}S^{u}.

4.5.3 **Nuns' Bank** LMS •R• NT 65713 58164 $_{Sc1}$ *nun* + $_{Sc1}$ *bank*^{1} (*PBWK*, 41)

Nunbank 1636×1652 *Gordon* no. 58
Nunnbanck 1654 *Blaeu (Pont) Mercia*
Nuns' Bank 1862 *OS 6" BWK*, IX

'*Nunnbank†*' is Johnston's rendering of the name. The above historical forms are all can be traced. *OSNB* gives the following account of the name's origin:

> A small hill feature on the North Side of "Dye Water", upon which, stood a house that was occupied by two women, which [*sic*] were called "the Nuns" by their neighbours, hence the name. The house has been completely removed.
>
> (OS1/5/31/50)

If correct, this would rule out a connection with the Cistercian priory at Abbey St Bathans some 11 km away, which operated 1184×c.1276–c.1587 (Cowan 1976, 148). However, inclusion of the name on maps from the early seventeenth century hints at a more sustained relationship with a religious house than the *OSNB* entry supplies two centuries later. With the exact location of the settlement inferred from the relief-feature, Nuns' Bank achieved ∑=2.5 'very probable' for the co-appellative •R•<>•S*.

4.5.4 ***Todlaw*** CHK •R• NT 44194 53136 $_{ESc}$ *tod* + $_{ESc1}$ *law*^{1} ('WRR' *PBWK*, 49)

de terra Samsonis scilicet *Todlaw* 1222 *Dryburgh Liber* no. 84
de terra Samsonis scilicet *Todlaw* c.1222 *Dryburgh Liber* no. 85
de terra Samsonis scilicet *Todlaw* 1222×1229 *Dryburgh Liber* no. 88
?~ *Toddle Burn* 1854 *OS 6" MLO*, XXIII

~*Hartsyd* and *Clyntis* c. 1459 *Maitland*[170]
~terras de *Hertished* et de *Clentis* 1459 *RMS* ii no. 660
~de terris de *Hertishede* et *Clyntis* 1473 *RMS* ii no. 1125
~terras de *Clentis* 1479 *RMS* ii no. 1415
~terras de *Hartisheid* et de *Clentis* 1554 *RMS* iv no. 951
~terras de *Hartisheid* et de *Clintis* 1607 *RMS* vi no. 1904
~terras de *Hartisheid* et *Clintis* 1619 *RMS* vii no. 2025
~*Clints* 1654 *Blaeu (Pont) Laudelia*
~*Clynts* 1654 *Blaeu (Pont) Lothian*
~*Clint* 1752×1755 *Roy* [also *Clint hill*]
~*Clints* 1771 *Armstrong* [also *Clints Hill*]
~*Clints* 1797 *Blackadder* [also *Clints Hill*]
~*Clints* 1821 *Thomson* [also *Clints Hill*]
~*Clints* 1826 *Greenwood* [also *Clints Hill*]
~*Clints* 1845 *Fowler* [also *Clints Hill*]
~*Clints* 1854×1862 *OS 6" BWK*, XIII [also *Clints Hill*]

Dryburgh Liber nos. 84, 85, and 88 list 12 Lauderdale landholdings in identical order, which include the name *Todlaw* (Table 4.12). Seven of these eight places can be identified in a fourth charter (no. 279) a generation later. If the lands omitted by the later document are discounted, a landholding called *Tolchus* corresponds to *Todlaw* in the sequence. Identification of both places, if indeed they are different, is problematic.

All four charters agree the subject lands lie 'in the parish of Lauder'. However, what that signifies relative to the other Lauderdale parish, Channelkirk, is less than straightforward during the first half of the thirteenth century. The then recent establishment of Lauder burgh and its church within the territory of Channelkirk's jurisdiction led to a dispute over the right to teinds – the subject of charter no. 279 (Allan 1900, 97). Historically, all of Lauderdale had been a single ecclesiastical entity, so it is not inconceivable that *Todlaw* could have been situated within the bounds of present-day parish of Channelkirk. If this possibility is admitted, then Toddle Burn CHK STO •W• NT 42909 50107, which arises on Clints Hill CHK •R• NT 44152 53763 and has no historical forms before the advent of OS mapping, may

[170] Allan (1900, 446) claims this is the earliest reference to Clints. The substance of Maitland's account is confirmed by *RMS* ii no. 660.

commemorate *Todlaw* as the earlier name of Clints CHK •S• NT 44194 53136 with **Tod Law* > Clints Hill.

	Dryburgh Liber nos. 84 & 85 (1222), and 88 (1222×1229)		*Dryburgh Liber* no. 279 (1252)	Modern Name
1:	*Treburne, Treburne, Treburne*	2:	*Treburn*	Trabrown LAU
2:	*Pilmour, Pilmor* (x2)	1:	*Pylemor*	Pilmuir LAU
3:	terra Valteri Hostiarii (x3)		–	?
4:	*Withlaw* (x3)	3:	*Vittelaw*	Whitlaw LAU
5:	*Langelt, Langelt, Langelt*[171]		–	*Longhope* LAU •R• NT 51432 55444
6:	terra Huttredi / Hutredi de *Langelt*	4:	terra que fuit Willelmi de Blendi de *Langald*	~ *Longhope* LAU
7:	*Ailinuspeth, Hailisepeth, Ailinispeth*		–	?~ Allanbank LAU / ?~ Allan Water MLR
8:	terra Samsonis scilicet ***Todlaw*** (x3)	5:	***Tolchus***	?~ Toddle Burn CHK / ?~ Tollishill LAU
9:	*Aldenistoun, Aldenistoun, Aldinstoun*	7:	*Aldeniston*	Addinston LAU
10:	*Welpelaw, Welpelaw, Welplaw*	6:	*Welpelaue*	*Whalp Law* LAU •R• NT 52977 53775
11:	*Ilistoun, Lyolstoun, Lyalstoun*		–	Lylestane LAU
12:	*Burnecastell, Burncastall, Burncastell*	8:	*Burncastel*	Burncastle LAU

Table 4.12. The sequence of lands in four thirteenth-century *Dryburgh Liber* charters.

[171] The topography and early forms are very suggestive of a derivation from ESc **helde* 'a specialised term for an inclined plane, a long (horizontally) straight slope varying only little in steepness' (*LPN*, 177), but uncertainty prevents this rare hill-term from being added to Table 4.13. Compare MSc *heeld* 'sloping ground' *la16* (*CSD2* HEELD *n.*[1.1]).

With scant available evidence, the only certainties are that *Todlaw* is undocumented after 1229 and Clints before 1459, although 'the lands of *Hertesheued*' (Hartside CHK •S• NT 46968 53716), with which Clints is later associated (Allan 1990, 446–7), are on record from 1189×1196–present.[172] *REELS* offers a tentative etymology of Toddle Burn from $_{\text{Sc2}}$ *toddle* '(of running water): "to glide, purl, ripple" (*SND*)' + $_{\text{Sc1}}$ *burn*, but a derivation from **Tod Law*, presumably $_{\text{ESc}}$ *tod* 'a fox' + $_{\text{ESc}}$ *law*, remains possible. Against this must be weighed the perhaps greater likelihood that the site of Clints before 1459 would owe teinds to the church at Channelkirk rather than to the newer foundation at Lauder. The evidence for *Todlaw* ~Toddle Burn is circumstantial. In terms of triage, $_{\text{ESc1}}$ *law*^{1} suits the terrain of Clints Hill, and the form is documented before 1450, which together achieves a ∑=3.0 'proven' for the co-appellative *R*<>•S*. However, as identification of the location is less firm, this place-name will be examined separately to evaluate the extent to which it correlates with other instances of $_{\text{ESc1}}$ *law*^{1} (see Table 7.2).

PBWK1 (*Appendix G*) records the results of applying triage to the four *PBWK* toponyms examining five elements, four of which achieved ∑≥2:0 and so could be admitted to the final corpora (BWK1 or BWK2, and BWK3).

4.6 Final Berwickshire Corpora

BWK1 comprises Berwickshire place-names with hill-terms (having a ∑≥2:0), grouped by co-appellative type (*first degree*, *second degree*, and *collocated*), and ordered alphabetically by element.

[172] NRS, RH 6/12 <www.poms.ac.uk/record/source/6040/>, accessed August 2020.

BWK2 replicates this arrangement for relief-feature names for which no associated settlement can be traced. BWK3 is an alphabetical index by head-name of the toponyms occurring in BWK1 and BWK2.

Brittonic (6)	**blajn*^{2}, **bre*, **brïnn*, **brun*, **dīnas*, **ros*
Early Scots (10)	*bell*, **clif*^{2}, **clif*^{3}, *doun*, *heved*, *huch*, *knoll*, *law*, *rig*, *side*
Gaelic (1)	*dùn*^{2}
Old English (9)	*bune*, *dūn*, *hlāw*, *hōh*, *hōh*^{2}, *hyll*, *nes*, **nesu*, *sīde*
Scots (21)	*bank*, *bell*, *brae*, *clint*, *dod*, *dod*^{2}, *doun*, *drum*, *edge*, *heid*, *hill*, *kame*, *knock*, *knowe*, *law*, *nes*, *rig*, *ross*, *side*, *snuke*, *steel*
Scottish Standard English (14)	*bank*, *bell*, *brae*, *craig*, *edge*, *head*, *hill*, *knowe*, *law*, *pike*, *point*, *ridge*, *rig*, *side*

Table 4.13. Berwickshire hill-terms (BWK1 and BWK2) available to test the GCH.[173]

Table 4.4 gave the provisional tally of 69 elements at the end of triage Stage 1. Additional sources and the triage process have subsequently introduced new elements to the test corpus and eliminated others as being doubtfully evidenced. The number of elements in BWK1 (48) and BWK2 (32) together total 57 separate hill-terms (61 senses). Table 4.13 groups these 61 testable hill-term senses by language label, and Table 4.14 lists the 28 senses and three adjectives that were reviewed but have been excluded by triage.

Brittonic (2)	**crū̆g*, '**pennos*'[174]
Early Scots (4)	*hill*, *rig*^{4}, *side*^{2}, *steel*^{2}
Gaelic (2)	*druim*, *ros*
Old English (2)	*berg*, *crūc*
Scots (13)	*cairn*^{2}, *craig*^{2}, *fell*, *heid*^{2}, *heid*^{4}, *heuch*, *hill*^{3}, *hirst*, *kippie*, *knowlie*, *pike*^{2}, *scaur*, *steel*^{3}
Scottish Standard English (8)	*cairn*, *craigie*, *headrig* [s.v. *head*^{3}], *heuch*, *mount*^{2}, *mount*^{3}, *steel*^{2}, *steel*^{4}

Table 4.14. Berwickshire hill-terms eliminated by triage.

[173] Superscript indices in Tables 4.14 & 4.15 refer to the senses of Table 4.7. Unindexed elements are sense 1.
[174] *NPSB* derives Penmanshiel Moor CBP and Penshiel WTG ('CRS') from 'OCelt **pennos*' (see Table 3.2). Doubt over this etymology eliminates it from further consideration. It is shown as rendered by the source.

	TOPOGRAPHICAL				NON-TOPO.		OTHER		BWK	
	•R•, etc[175]		•S•		•S•		•A•, •O•, •U•		Totals	
Par.	no.	%	no.	%	no.	%	no.	%	no.	%
ASB	31	74	3	7	8	19	0	0	42	**2**
AYT	26	49	16	30	10	19	1	2	53	**3**
BUP	27	53	7	14	15	29	2	4	51	**2**
CBP	95	64	25	17	14	9	14	9	148	**7**
CHK	34	53	18	28	11	17	1	2	64	**3**
CHM	178	58	66	21	40	13	23	7	307	**15**
CHS	7	33	6	29	7	33	1	5	21	**1**
CRS	20	69	4	14	3	10	2	7	29	**1**
CSM	79	48	31	19	38	23	16	10	164	**8**
DNS	32	40	21	26	22	28	5	6	80	**4**
EAR	15	35	21	49	6	14	1	2	43	**2**
ECC	79	47	43	26	36	21	10	6	168	**8**
EDR	13	24	20	36	21	38	1	2	55	**3**
EYM	7	54	6	46	0	0	0	0	13	**1**
FOG	7	29	7	29	10	42	0	0	24	**1**
FOU	24	49	9	18	13	27	3	6	49	**2**
GOR	12	39	8	26	9	29	2	6	31	**1**
GRE	31	53	18	31	8	14	1	2	58	**3**
HUM	6	29	7	33	8	39	0	0	21	**1**
HUT	25	32	12	16	33	43	7	9	77	**4**
LAU	80	60	31	23	19	14	4	3	134	**6**
LEG	10	37	11	41	5	19	1	4	27	**1**
LGT	17	52	11	33	4	12	1	3	33	**2**
LKK	37	50	9	12	17	23	11	15	74	**4**
LMS	60	72	12	14	10	12	1	1	83	**4**
MER	8	23	9	26	13	37	5	14	35	**2**
MRD	25	42	10	17	18	31	6	10	59	**3**
NEN	3	20	6	40	5	33	1	7	15	**1**
PWH	9	64	2	14	3	21	0	0	14	**1**
SWN	7	30	8	35	8	35	0	0	23	**1**
WHI	6	29	9	43	6	29	0	0	21	**1**
WRR	18	35	21	40	12	23	1	2	52	**3**
	1,028	**50**	**490**	**24**	**432**	**21**	**121**	**6**	**2,068**	**100**

Table 4.15. Topographical vs. non-topographical Berwickshire place-names by civil parish.

[175] This column includes place-names with the OS classifications •C•, •F•, •I•, •R•, •V•, and •W•.

The total of Berwickshire place-names investigated is 2,068, of which 1,515 (73%) are topographical names; 490 (24%) denote settlements and 1,025 (50%) relief-features.[176] The total number of non-topographical place-names is 432 (21%). The relative proportion of topographical names (referring to both settlements and relief-features) vs. non-topographical ('habitative') names is shown in Table 4.15, and this also provides the tally of place-names per civil parish.

4.7 Conclusion

To solidly establish a hill-term is evidenced in a place-name and to pair it with the correct relief-feature takes considerable effort. Comparing the level of research required to adapt *REELS* data, which is ostensibly 'ready-assembled', with processing the additional head-names extracted from *NPSB*, *BONG*, and *PBWK*, has underscored the necessity of working from reliable modern county surveys or their equivalents. Without such a foundation, the actual presence of target elements in a place-name will be far more speculative. And critically, any attempt to evaluate the GCH against such data risks being skewed by the inclusion of erroneous examples.

The methodology presented here has illustrated one verifiable and replicable procedure to assemble corpora and it has explored solutions to the issues that have arisen. The centrality of the relationship between settlement and relief-feature – here termed *co-appellative* – emerged during this process and a system to encode the reliability of that association whilst recording the degree of researcher inference has been implemented. This auditing of the data will facilitate a future re-evaluation of the conclusions derived from it. This exercise also allowed errors and aberrant values to be quickly identified, and for segments of the corpus to be graded, grouped, and contrasted in order to assess their potential research value. This

[176] *Appendix H* is excluded from this calculation due to the problematic nature of PBWK2 data (§4.5).

chapter has highlighted a key concern of the whole study: in seeking to evaluate the GCH, the prime consideration is to ensure every toponym actually manifests the element to be tested.

TOPONYMETRY

Chapter 5

5.0 Summary

This chapter describes and applies the first assay of *toponymetry*, a new methodology for measuring and comparing the physical attributes of relief-features in the context of toponomastic research. Toponymetry thus denotes an investigation of topographical place-names using a geomorphological quantification of landscape.[177]

Within the past decade, advances in geoscience have generated a variety of innovative and highly-accurate tools to conduct *semi-supervised* and *unsupervised* measurement and categorization of the Earth's surface based on data from aerial surveys.[178] One method of interpreting such data, *geomorphons*, will be adapted here to create an unsupervised dataset of Berwickshire hill-parameters. These attributes will then be subjected to statistical analysis to discover whether a correlation exists, in the manner predicted by the GCH, between selected geophysical properties and the generic elements of hill-names.

5.1 Do hills have an edge?

For a comparison of relief-features within and between categories to be consistent and valid, a clear and precise definition of category membership is required. To that end, *HPND* (pp.

[177] I am grateful to Oliver Padel for his reflections on this neologism (personal conversation, Blackwaterfoot BUT, April 2018).

[178] In computing science, these terms denote whether human intervention has to some degree preconfigured aspects of a dataset to which algorithm-based processes are subsequently applied. Ahead of these word senses receiving an appropriate *OED* definition, further information can be found at <https://en.wikipedia.org/wiki/Unsupervised_learning>, and <https://en.wikipedia.org/wiki/Semi-supervised_learning> [accessed February 2021].

66–245) – the only previous major study to have sought to evaluate the GCH – translates the sporadic statements in *LPN* and *PNL* regarding specialization and consistency into more precise definitions. As reviewed (§3.1.3), that methodology entails the creation of hill-descriptors (impressionistic but standardized verbal statements – *HPND*, 23, fn. 1) which are then conflated with the estimated parameters of physical relief-features. A typical example would be:

> ***length*** extent of a *slope* or *hill-side* measured along the contours, the extent of a *hill-spur* or *ridge* measured from one end to another, or the extent of one of the two dimensions of a *hill* or *eminence* (cf. *width*).
>
> ***long*** used of *hills*, *hill-spurs* and *ridges* which measure at least 750 metres in *length*, and which are at least three times as long as they are wide (*length* = at least 3 x maximum *width*), and of *hill-sides* and *slopes* which are at least 750 metres long (cf. *narrow*).
>
> (*HPND*, 24)

To determine whether the GCH operates as predicted in Northumberland and County Durham, Nurminen prepared definitions composed of such descriptors for a representative sample of named hills and then compared these with descriptions derived from *PNL* and *LPN*. And yet, the seemingly transparent phrase 'measured from one end to another' conceals a practical yet critical methodological issue with such quantified data: the 'ends' themselves are not specified.

In her study, Nurminen estimated the physical proportions of target relief-features by tracing boundaries relative to contour-lines on map-printouts downloaded from EDINA's *Digimap* service.[179] Unfortunately, neither examples of these annotated maps nor a statement of the principles involved in their production are included in the study. With clear guidance on how to replicate the parameters used by *HPND*, possibly through illustrations or the specification of hill-boundary coordinates, the means to recreate a comparable dataset for Berwickshire, or elsewhere, could have been available. Regrettably, the degree of subjective evaluation

[179] Personal communication, October 2016.

involved in conducting measurements by this means is too great for datasets created by subsequent investigators to be genuinely comparable. Determining where a hill begins (or ends) within a landscape is essential for the calculation of accurate, replicable, and standardized parameters. Manually measuring hundreds if not thousands of hills to ensure statistical relevance is enormously time-consuming, and under most circumstances the method exemplified by *HPND* precludes the quantification of terrain features at a sufficient volume to be statistically significant. To establish the categories proposed by the GCH are indeed discrete and possibly 'specialised' and/or 'consistent', as *HPND* endeavours to do, large datasets of consistent parameters are essential. This chapter, therefore, seeks to address these two aspects simultaneously by employing a novel means to automatically measure the physical attributes of relief-features *en masse*, whilst automating the delineation of boundaries.

Before proceeding to describe this procedure, the cognitive and philosophical considerations inherent in the question of boundaries must briefly be acknowledged. Mountains and hills as elements within landscapes have frequently provided useful illustrations for some of the ontological and psycholinguistic issues that confront investigators in the sciences of cognition and philosophy (Smith and Mark 2003; Fisher *et al*. 2004; Mark *et al*. 2011). Indeed, the emerging discipline of *liminology* (Casey 2011, 91) offers important insights into this fundamental component in the organization of human thought, and especially the tendency for the eye or hand to seek edges in order to distinguish and organise sense impressions as the basis for cognitive interpretation (*ibid.*, 103). Being able to determine the edge of a relief-feature, however simple to achieve that may initially seem, is a vital aspect of human perception and fundamental to the processes of linguistic categorization the GCH proposes. Without digression into this intriguing new area of research, it is possible to generalize that a relief-feature becomes knowable and therefore nameable because it has a boundary, however vague, that can be distinguished, and also such perceptions are somehow shared between observers. We might go further and speculate that the identification of an edge of some kind may well provide an important stimulus for the naming of topographical places. A delineation of boundaries is therefore taken to be an essential prerequisite for testing the GCH with regard to relief-features.

5.2 Geomorphometry and Toponomastics

> Two topographical terms used for steep-sided valleys in northeast England are 'dene' and 'gill'. Inspection of their use in proper names on maps of East Durham shows that application is consistent. 'Denes start around 100 m altitude and their channels slope at 14 to 30m km^{-1}. […] Valley-side slopes are generally steeper than 14 degrees. Similar valleys shorter than 700 m are known as gills'.
>
> (Evans 2012, 98, citing Evans 1999, 57)

This observation comes not from a toponymist familiar with the work of Gelling and Cole but a leading researcher in the science of geomorphometry. Although Matley (1965; 1982; 1990 – §3.1.2) does investigate selected topographical elements from the perspective of geography, Evans' insight appears to be the first step towards toponomastics, which the present study attempts to reciprocate in the direction of geomorphometry. Given that *LPN* itself arose from the collaboration of a philologist and a geographer (*LPN*, xiv), taking this convergence of disciplines to the next stage seems logical and natural.

Geomorphometry, as the core field within geomorphology, seeks to measure and analyse the Earth's surface. The increasingly widespread availability of Digital Elevation Model (DEM) data (i.e. high-resolution aerial surveys) for the entire planet – and indeed other planets and planetoids with rocky surfaces – has transformed geomorphometry by facilitating the development of digital tools to perform sophisticated modelling and analysis (Evans 2012, 94).[180] Using coordinate-based systems, this variety of software is able to efficiently process very high volumes of data at a range of macro- and micro-scales that could not

[180] This article also provides a succinct history of how issues of scale in using digital elevation modelling to quantify landscape have been approached and largely resolved by improvements in higher resolution surveying.

feasibly be interpreted manually by a human being. Furthermore, with the advent of Geographic Information System (GIS) technology, all knowledge associated with one or several locations has now the potential to be indexed and digitally analysed. Through the marriage of databases, web-based search applications, and data-mining algorithms, opportunities for completely new analyses and insights are emerging in every academic discipline and area of modern life, including satellite navigation systems, political campaigning, actuarial science, social media platforms, transport and logistics, public health, tourism, telecommunications, *Google Earth*, etc. These advances also introduce the potential to create powerful new ways to conceptualise and investigate place-names. In essence, two-dimensional distribution-maps, which have played such an important role in onomastics, can now be interrogated digitally in two, three, and four dimensions, i.e. both spatially and chronologically. This aspect of database design is yet to be fully embraced, although the means to do so are now available. The opportunities thus offered by GIS are self-evident for toponomastics, which by its nature synthesizes and analyses disparate sources of information linked to physical localities through time.

Methodologically, geomorphometry conceptualises relief-features not as objects *per se*, but as factors that influence processes such as: erosion by water or ice, climatic variation and conditions, the composition of soils, diversity within ecosystems, and so on. Thus, the boundaries of geoscientific categorization reflect not fixed limits but transitional zones in various states of flux. Fortunately for present purposes, the very detailed quantification of geomorphometry also employs the portmanteau concepts of *landform* as a unit within *landscape*. These terms label clusters of characteristics as hypothetical spatial entities with implicit boundaries, and in this respect they approach more closely to an everyday human experience that differentiates and names 'types' (in the semiotic sense) as *hill*, *valley*, *plain*, etc.

5.2.1 Landforms

Specific geomorphometry (vs. general geomorphometry, which analyses the whole surface of terrestrial planets) is concerned with the measurement and classification of *landforms*, defined as 'bounded segments of a land surface' (Evans 2012, 94–5). These occupy an intermediary stage in a hierarchy of *land elements* (elementary forms) that comprise *landforms* (functional regions) within *landscapes*. Mark and Smith (2004, 84–85), for example, tabulate 25 landforms that comprise 151 separate types; of these, eight landforms (shown in bold in the fn.) with 78 types (52%) refer to varieties of hill.[181] The range of languages drawn upon in formulating these geoscientific terms testifies to the universal human tendency to name segments of landscape. It is interesting to note in passing that this particular list attributes some types to more than one landform, implying thereby that categorization perhaps depends on something other than geomorphology alone.

It should be stressed that the scientific classification of every terrestrial landscape into landforms including 'the bits left between' to borrow Evans' phrase (2012, 95) remains incomplete at present. Some types are far more amenable to delimitation, e.g. *cirque* ('corrie'), *drumlin*, *island*, *lake*, whilst others are far less so, *dale*, *delta*, *plain*, *saddle*, *strath*. In practice, there are varying degrees for which the closed perimeter of a feature can be determined (*ibid.*, 94), and as Szypuła (2017, 99) observes: 'there is always a problem with the boundary of the landform. And herein DEMs are helpful'.[182]

[181] ***Cliff*** (*beach scarp*, *bluff*, *ceja*, *crag*, *escarpment*, *ice cliff*, *marine cliff*, *palisade*, *precipice*, *scar*, *scarp*, *scaw*); ***Mount*** (*bald*, *bank*, *bery*, *cerrito*, *cerro*, *cinder cone*, *cuesta*, *dome*, *drumlin*, *foothill*, *hill*, *hillock*, *hummock*, *kame*, *knob*, *knoll*, *lava cone*, *monadnock*, *mound*, *mountain*, *pingo*, *rise*, *sand dune*, *sand hills*, *seaknoll*, *seamount*, *shield volcano*, *volcano*); ***Mount range*** (*mountain range*, *range*, *seamount chain*, *seamount group*, *seamount range*); ***Peak*** (*ice peak*, *nunatak*, *seapeak*, *summit*); ***Pinnacle*** (*chapeirao*, *coral head*, *crag*, *pillar*, *precipice*, *scar*); ***Plateau*** (*butte*, *guyot*, *intermontane plateau*, *mesa*, *tableknoll*, *tableland*, *tablemount*); ***Ridge*** (*arête*, *beach cusps*, *beach ridge*, *cerro*, *crest*, *cuesta*, *drumlin*, *esker*, *kame*, *range*, *sand dune*, *sand hills*, *sill*, *spur*, *volcanic dike*); and ***Terrace*** (*bench*, *kame terrace*, *marine bench*, *raised beach*, *rock terrace*). For an overview of landform terminology, see <https://en.wikipedia.org/wiki/Glossary_of_landforms>, accessed January 2021).

[182] Szypuła 2017 provides a useful overview of the developments in landform delineation over the past 60 years, with a particular focus on more recent digital approaches.

Before 2011 and almost exclusively since, segmentation of terrain by geomorphologists has been achieved by a range of software-led approaches using differential geometry to determine 'breaks' in gradient or aspect, or degrees of curvature (Stępiński and Jasiewicz 2011, 109; Evans 2012, 94), but these may also include characteristics such as catchment areas, distance to streams, and depression depth (Szypuła 2017, 99). Auto-segmentation, both unsupervised and semi-supervised (§5.0) has been performed upon satellite-generated DEMs, but using these to classify large areas can be expensive (in computing terms) due to the high volume of data to be processed. A further limitation, affecting all methods including the one described below, is the attenuation of accuracy if vegetation and buildings are *smoothed* (digitally homogenized) to achieve an average surface measure, or conversely if left unfiltered, they can disrupt classification (§5.5.1). Similarly, the quantification of some of the toponyms examined in this chapter (and Chapter 6) are negatively impacted by earthworks of various kinds as well as by landscape modification (e.g. quarrying), which have altered and at times completely erased the original landforms we presume inspired the use of particular name-elements (§6.1.2). Lastly, although terrain elevation data from aerial laser surveys (LiDAR - Light Detection and Ranging) is already available as very high resolution DEMs that would increase considerably the accuracy of source data, to date only a few selected areas of Scotland have been surveyed using this technology.

5.2.2 Geomorphons

Two articles, Stępiński and Jasiewicz 2011 and Jasiewicz and Stępiński 2013, introduce and elaborate a highly original approach to landform classification and mapping. This marks a distinctive shift away from previous methods that apply calculus-based procedures to delineate discrete elementary units of terrain morphology. The authors emphasise that their system of classification recapitulates aspects of human perception:

> A starting point is the observation that an analyst who manually classifies landforms from a DEM (using a map of shaded relief or a contour map) does not make decisions based on geomorphometric variables, but instead identifies the whole topographic patterns corresponding to specific landforms. Our method capitalizes on this observation; we classify landform elements using tools of *computer vision* rather than tools of differential geometry. Thus, our algorithm attempts to mimic the classification process carried out by a human analyst. [my emphasis]
>
> (Jasiewicz and Stępiński 2013, 148)[183]

This approach has several important advantages for the current purpose. Principally, it does not result in an aerial view of relief-features, which would run counter to the presumed experience of name-coiners, whom we may suppose most often viewed elevated features from below.[184] Although the extended geomorphon software (§5.3) does use the summit co-ordinates (NGRs) of hills and ridges, and the *highest indicative point* (§5.3.1.1) of hill-spurs, the perspective is not from above looking downwards as when one looks at a map. Rather, *computer vision* refers to a method by which the software calculates the extent of each landform in eight directions using a line-of-sight formula.

Line-drawings, reproduced from photographs taken in the field, have been regarded an as integral aspect of the GCH methodology (§1.2.3; §2.4.2; §3.1.3.2). Gelling celebrates their usefulness (*LPN*, xiv) and Nurminen faithfully reproduces comparable sketches using *Corel Paint Shop Pro X* (*HPND*, 43).[185] Whilst advocating the benefits of fieldwork in confirming the presence of subtle terrain features that may not register on maps or DEMs, this thesis does not use line-drawings. In their stead, the computer vision of geomorphons is offered (see Vol. III). This has the additional merit of automatically generating relief-feature metrics with standardized parameters. What follows is an attempt to translate into non-computing

[183] Later developments based on the methodology are not central to the current study, but in Chapter 8 one particular direction this research has since taken will be reviewed for its potential to deliver additional toponymetric tools (§8.1).
[184] This point was also considered in the discussion of *Shollesclif* (Choicelee) LGT – §4.3.7.
[185] Ann Cole has kindly shared the process she used in creating the line illustrations that appeared first in Gelling 1998 and later in *LPN*. A slide-projector image was trained onto a sheet of paper attached temporarily to her kitchen wall. She would then trace onto the sheet the outlines of features in the projected photograph (personal conversation, Didcot OXF, March 2017).

science terms the main principles by which this system operates and has been adapted. For the original specification and demonstration, see Jasiewicz and Stępiński 2013.

Stępiński coined the term *geomorphon*. He comments:

> From my work on patterns in images I was familiar with the term "texton", which is a unit of perception of texture.[186] Using texton in the context of geomorphometry would be confusing and using "morphon" appeared to me not attractive for geomorphologists, so I decided on "geomorphon".[187]

DEM data (i.e. the collated measurements of altitude sampled at regular intervals by an aircraft or satellite flying over the terrain) can be rendered as an image composed of grey-scale pixels (cells), in which degrees of greyness represent actual measurements of surface altitude; e.g. darker cells representing lower altitudes and lighter cells, higher. When shaded (with visualization editing) such images have an apparent texture, in which a human observer will recognise patterns readily interpreted as three-dimensional valleys or ridges, etc. The geomorphon software uses a technique developed for image-texture recognition but adapted to distinguish the 'archetype of [a] particular terrain morphology' (*ibid.*). It does this by an elegant and computationally efficient method.

Every cell in a DEM image is assigned one of three values relative to the cell at the farthest point from it along each of eight cardinal axes (NE, N, NW, W, SW, S, SE, E); the threshold for determining these cardinal cells being the point at which there ceases to be a specified mathematical relationship between it and the central cell or point of interest (POI). In fact, two angles are computed to achieve this. The first equals the angle between the zenith (i.e. the vertical axis through the POI that extends out from the centre of the Earth) down to the eight lines-of-sight between the POI and its cardinals. The second, the nadir angle, is

[186] *Texton* was first used by Julesz (1981).
[187] I am grateful to Tomasz Stępiński for offering this explanation of the origin of the term. He also kindly clarified that the frequently repeated statement that *geomorphon* represents a 'geomorphologic phonotype' (Stępiński and Jasiewicz 2011,109; Jasiewicz and Stępiński 2013,147) should actually read 'geomorphologic phenotype' (personal communication, 29 November 2020).

measured between the same vertical axis up to a hypothetical line-of-sight relative to the horizontal. A formula returns one of three results from a comparison of each POI with each of its eight cardinals:

'−' the cardinal cell has a lower altitude than the POI;

'0' the cardinal cell has the same altitude to the POI; and

'+' the cardinal cell has a higher altitude than the POI.

This three-way classification is called a *local ternary pattern* (LTP) and by this procedure every cell in the DEM can be encoded with an eight-fold (8-tuple) signature-string, starting with the NE relationship and circling anticlockwise to E.[188] For example, the string '+ + + 0 + + + −' means NE is: higher (+) than the POI; N is higher (+) than the POI; NW is higher (+) than the POI; W is on the same (0) level as the POI; SW is higher (+) than the POI; S is higher (+) than the POI; SE higher (+) than the POI; and E is lower (−) than the POI.[189]

Theoretically, there are 3^8 (6,561) possible permutations of LTP, but by eliminating duplicates, arising from mirror-images of other patterns and rotations, a finite number of 498 is reached (Fig. 5.2). The authors claim this set of 498 LTPs, which they term *geomorphons*, is capable of characterizing all possible landforms, although some are not found in the natural world and many are quite rare (Stępiński and Jasiewicz 2011, 109–110; Jasiewicz and Stępiński 2013, 149). They observe the most frequent naturally occurring landforms are represented by the geomorphons with the fewest *transitions*, i.e. the lowest number of changes in the signature-string in cycling anticlockwise through each of all eight cardinal cells. Table 5.1 illustrates the ten commonest geomorphons: three have no transitions (*flat*, *peak*, and *pit*); four have two transitions (*shoulder*, *spur*, *foot slope*, and *hollow*); and three have four transitions (*ridge*, *valley*, and *slope*).

---

[188] Table 5.1 shows how LPTs can be represented by: i) a signature-string of pluses, minuses, and zeroes; ii) a numerical or alphabetical code (§5.2.2.1); or iii) asterisk-like symbols comprised of eight spokes with coloured terminals.

[189] Jasiewicz and Stępiński 2013 (p. 148) states that the string of comparisons begins with the E cardinal cell, whereas Ovsienko (§5.3) has discovered the software actually starts with the NE comparison.

	LTP	Signature-string	Geomorphon	Transitions relative to the POI
0 transitions		0 0 0 0 0 0 0 0	***flat*** (FL)	**8-in-a-row** same level (**=**)
		− − − − − − − −	***peak*** (PK)	**8-in-a-row** lower level (**<**)
		+ + + + + + + +	***pit*** (PT)	**8-in-a-row** higher level (**>**)
2 transitions		− − − 0 0 0 0 0	***shoulder*** (SH)	**<3-in-a-row** | **=5-in-a-row**
		− − − − − + + +	***spur*** (SP)	**<5-in-a-row** | **>3-in-a-row**
		+ + + 0 0 0 0 0	***foot slope*** (FS)	**>3-in-a-row** | **=5-in-a-row**
		− − − + + + + +	***hollow*** (HL)	**<3-in-a-row** | **>5-in-a-row**
4 transitions		− − − 0 − − − 0	***ridge*** (RI)	**<3-in-a-row** | **=1** | **<3-in-a-row** | **=1**
		+ + + 0 + + + 0	***valley*** (VL)	**>3-in-a-row** | **=1** | **>3-in-a-row** | **=1**
		− − − 0 + + + 0	***slope*** (SL)	**<3-in-a-row** | **=1** | **>3-in-a-row** | **=1**

Table 5.1. The ten commonest *geomorphons* with 0, 2, and 4 signature-string transitions (|).[190]

Geomorphon codes for each cell in a DEM are aggregated by the software to delineate areas of congruence. From these representations, whole landscape maps are generated with coloured areas showing the ten commonest landforms (Fig. 5.1). In the literature, the method is demonstrated using DEM data for the whole of Poland at a scale of 30 m, which a 2.66 GHz single processor Linux computer is able to visualize as a geomorphon map in approximately three hours (Jasiewicz and Stępiński 2013, 153–154). This underlines the fact that the methodology is ideal for computing the landforms of very large landscapes. It does so by adjusting to the actual terrain as it computes so that both large and small features are identified automatically (*ibid*., 152).

[190] In these symbolic representation of LTPs (geomorphons), the intersection of the eight vertices is the POI – blue terminals represent a **lower altitude** (-) than the POI, green the **same level** (0), and red a **higher altitude** (+), respectively.

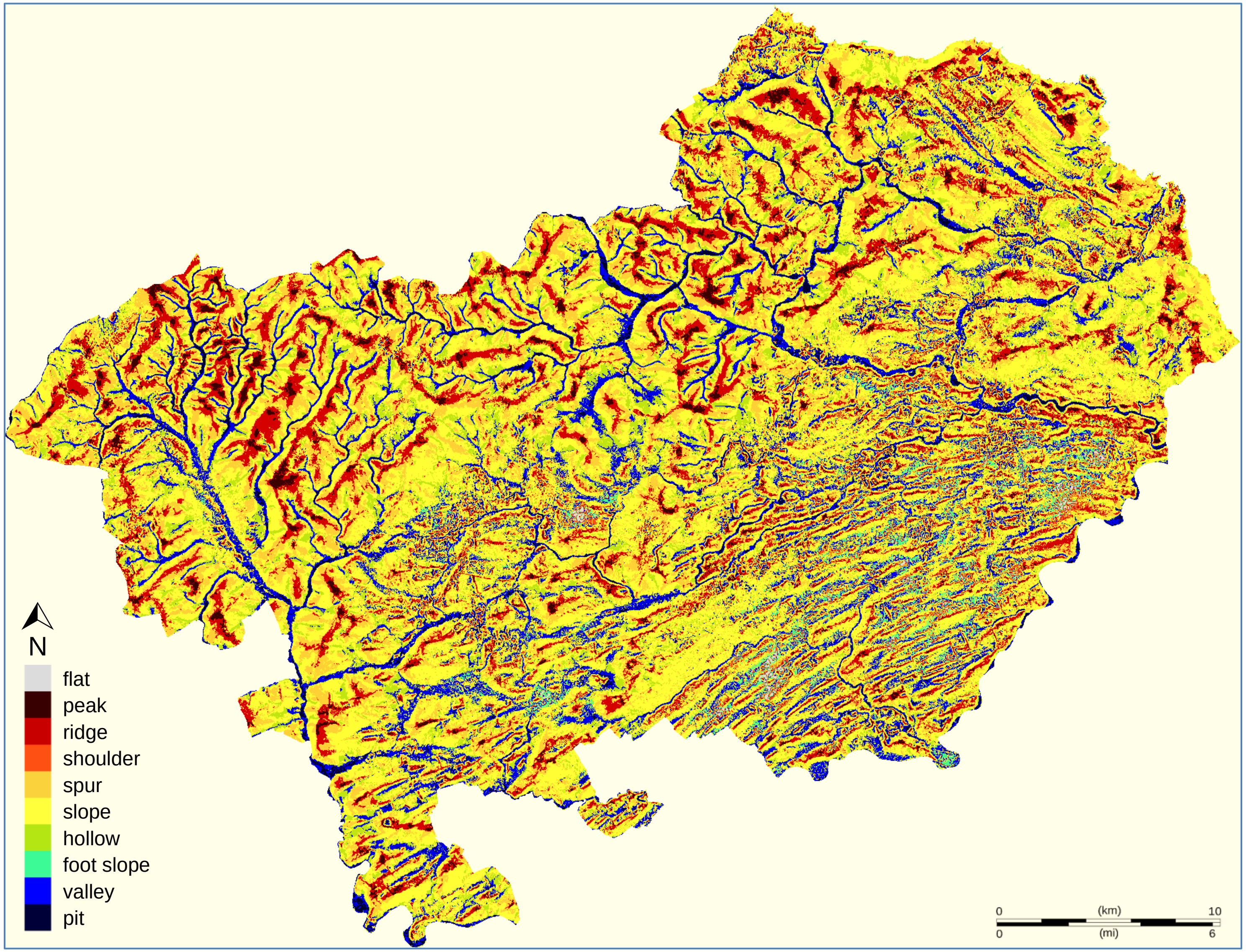


Fig. 5.1. A geomorphon map of Berwickshire. (Original computation: Davydh Trethewey (2020) using ALOS World 3D - 30 m (AW3D30) Version 3.1).

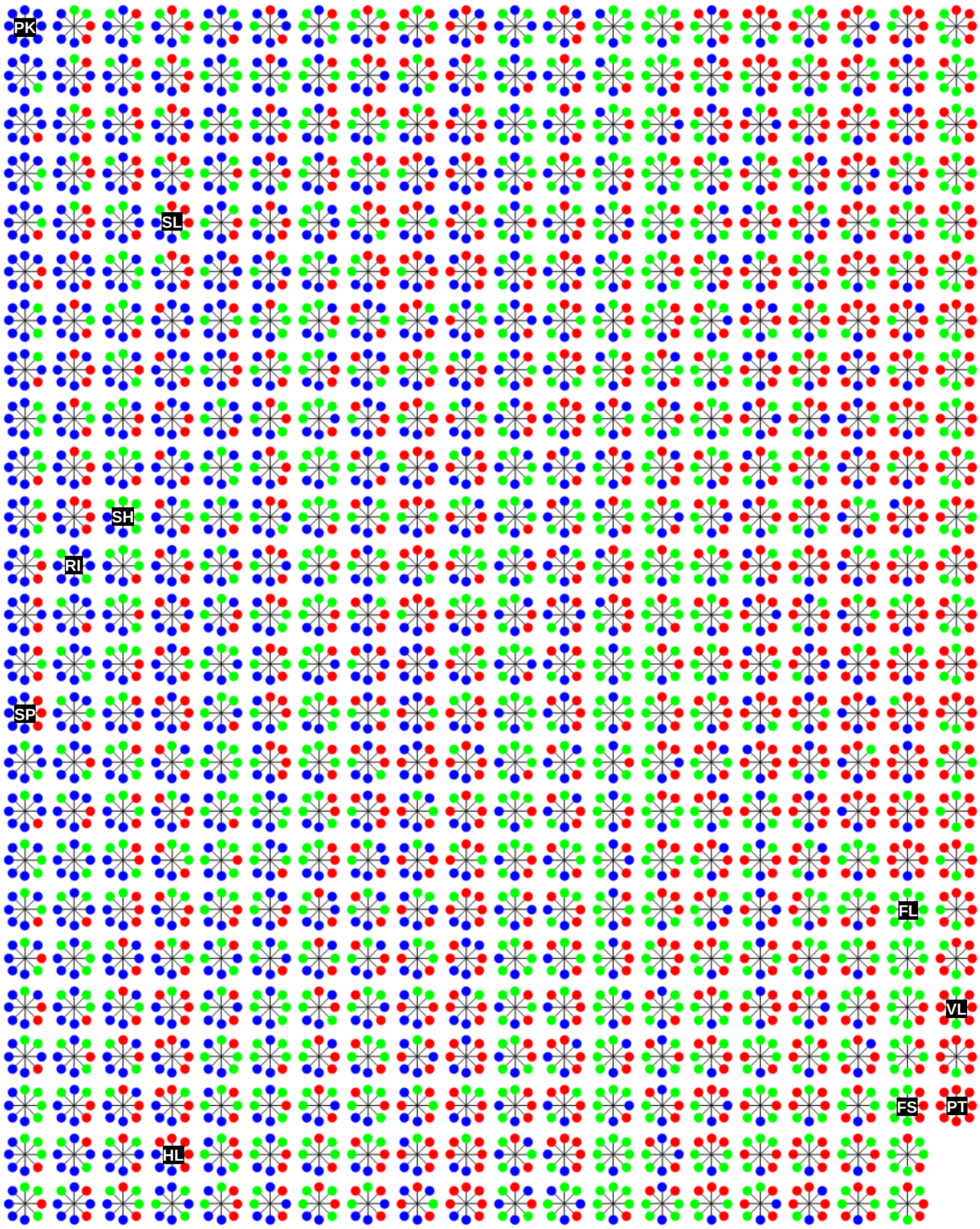
Human intervention in the computation process sets two constraints.[191] These specify the maximum radius (*search*) from the central cell (POI), at which calculations in each of the eight directions should cease, and the magnitude of computed values considered significant enough to signal a change of landform (*relief threshold*). Larger values of search radius create higher, wider, and less local perspectives. Varying the relief threshold causes more subtle or minor changes of terrain to be included or ignored (*smoothed* – §5.2.1). This is controlled by a variable (*skip*), which eliminates local anomalies in the terrain surface, and two others (*flat* and *dist*) compensate for the low salience of features in very level landscapes. These variables are introduced into the formula that computes the zenith and nadir angles for each of the eight lines-of-sight. Figure 5.1 shows a typical geomorphon map.[192]

Some examples, to which the geomorphon methodology has been applied, include: predicting soil classes (Pinheiro *et al.* 2016); ocean-floor surveying (Di Stephano and Mayer 2018); mapping glaciated landscapes (Sărășan *et al.* 2018); and quantifying water-systems in dynamic landscapes (Baker *et al.* 2018). This thesis is the first attempt to investigate a place-naming hypothesis using an extended version of the geomorphon concept.

5.2.2.1 Geomorphon Code Rationalization

The generation of geomorphon maps, as representations of landform distribution, involves the intermediate ascription of a code number (1–6,561) to each DEM cell. These momentarily label which of the 3^8 possible LTP permutations has been identified. The software rationalises these by conflating identical patterns with different symmetries and rotations to arrive at a finite set of 498 geomorphons (Fig. 5.2).

[191] These user-defined settings are introduced into the program via the file `config.sh` (see Fig. 5.4).
[192] Figure 5.2 was produced with specified parameters of: *search* = 50 (which in a DEM of 30 m cells = 1,500 m); *skip* = 0; *flat* = 1; and *dist* = 0.



The Ten Most Common Landforms:

PK *peak* (1 pattern)
SP *spur* (50 patterns)
RI *ridge* (31 patterns)
SH *shoulder* (63 patterns)
SL *slope* (193 patterns)
HL *hollow* (50 patterns)
FL *flat* (15 patterns)
FS *foot slope* (63 patterns)
VL *valley* (31 patterns)
PT *pit* (1 pattern)

Fig. 5.2. All possible geomorphon patterns (498 landform types), rationalized to ten named groups.[193]

[193] Adapted from an original figure by Tomasz Stępiński; annotated and reproduced with his kind permission.

Jasiewicz and Stępiński (2013, 149–150) find that 85% of natural landscapes can be represented by some 30 geomorphon patterns, and in practice the complete set of 498 can be usefully conflated with just ten that are the most common. Fig. 5.2 illustrates: the complete set of 498 geomorphons, the ten most common named, and the number (in parenthesis) of separate geomorphon patterns that are conflated to create these ten groups.[194]

The ten archetypal landforms can be readily paired into two sets of five polar opposites. Since elevation is the main focus of the present study, the geomorphon *slope* (SL)is considered to be acclivous in contrast to *flat* (FL); research focussed instead on valley-terms might reasonably reverse this ascription and consider *slope* a declivous characteristic and *flat* non-declivous:

Acclivous			***Declivous***
peak (PK)			*pit* (PT)
spur (SP)			*hollow* (HL)
ridge (RI)			*valley* (VL)
shoulder (SH)			*foot slope* (FS)
slope (SL)			*flat* (FL)

The purpose of this categorization is to highlight that five acclivous landforms comprise the primary elements of hill-shape. The GCH, of course, proposes that the hill-terms in place-names describe hill-shape in a systematic way. It follows therefore that a direct correlation between the five acclivous landforms and particular hill-terms should be observable if the phenomenon of the GCH is verifiable by this method.

194 §5.4.4 illustrates geomorphon codes turned into parameters.

5.3 Extended Geomorphons

The original 'reference' implementation of the geomorphon software generates landform maps of whole landscapes (Fig. 5.1). This section will provide a non-technical overview of a new customization that utilizes and extends geomorphon principles to characterise isolated relief-features (§1.5.1).

It will be immediately apparent that the procedure by which the software (*r.geomorphon*) computes discrete landforms (§5.2.2) presupposes the definition of a boundary between them, and moreover the perimeter thus delineated is *unsupervised*, i.e. it is determined by an algorithm rather than human choice. Beyond the specification of a *point of interest* (POI – §5.3.1.1) and search parameters (§5.2.2), the software will generate identical results from the same DEM data regardless of the operator. This offers the prospect that completely objective parameters might be generated for multiple hills, ridges, and slopes with a view to exploring possible correlations with the hill-terms in their names.

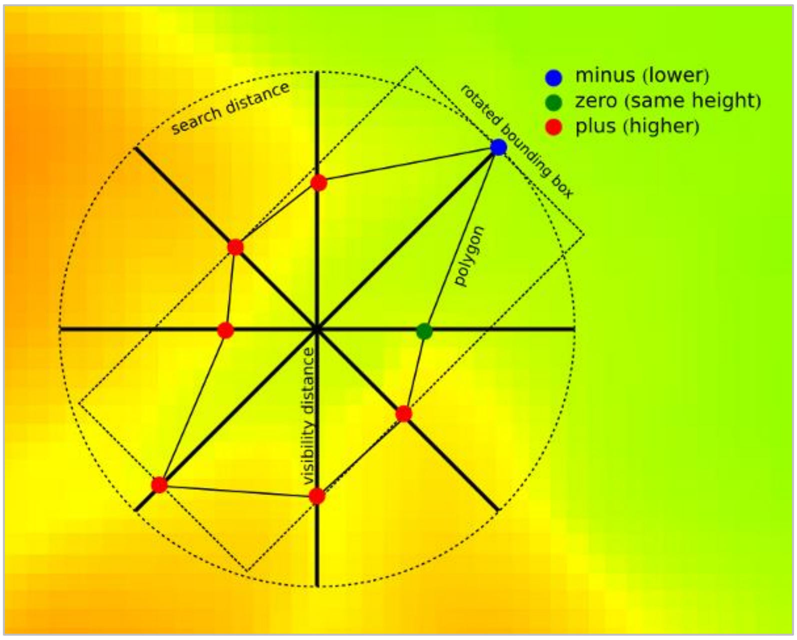


Fig. 5.3. 'What is a geomorphon:' (Jasiewicz and Stępiński 2011).

The *r.geomorphon* reference manual (Jasiewicz and Stępiński 2011) presents an illustration beneath the heading 'What is geomorphon:'. This diagram (Fig. 5.3 – reproduced here with kind permission of the authors) depicts a single geomorphon as an eight-sided polygon centred on a POI at the intersection of eight lines-of-sight (labelled *visibility distances*). One might anticipate that comparable images would be one of the outputs generated by the software. However, this is not the case. In practice, the program's repeated calculations of zenith and nadir angles are converted into LTPs (§5.2.2) that exist only as a transient representation in the source-code. The extraction of a single geomorphon polygon and its codes at various levels in this process is not possible using the original plug-in. Ovsienko undertook the challenge of making Fig. 5.3 an actual product of the software and of capturing which geomorphon codes (§5.2.2.1) are ascribed during the computation process.

The main elements of Ovsienko's software development can be characterized as three layers (I–III), of which only the first is not a wholly original creation (Fig. 5.4). Each layer in the sequence is controlled by the one following:

I. *GRASS GIS r.geomorphon extension* is a customization of the original application, modified to extract the cardinal co-ordinates (NGR$_{1\text{–}8}$) of a single geomorphon for a specified POI (NGR$_0$). Although developed separately, this system now sits as an integral part of the next layer;[195]

II. *Geomorphon Profiler* automates the *GRASS GIS r.geomorphon extension* to cycle through multiple NGRs in order to generate machine-readable (JSON) files of computed parameters. It also generates individual (PNG) images from the DEM input;

[195] For more information, see commits #1096 (06/12/2020) <https://github.com/OSGeo/grass/commit/ebf2de1343ded9eef3dc9e19f2a0f3eb172c76b0>, and #1157 (30/01/2021) <https://github.com/OSGeo/grass/commit/a76e8a167b8ecaca699a9c6c8751fbd4d4e66d8d>. Technical information, including the software source code and operating instructions, are available at <https://gitlab.com/geomorphon-hunters/place-name-props>.

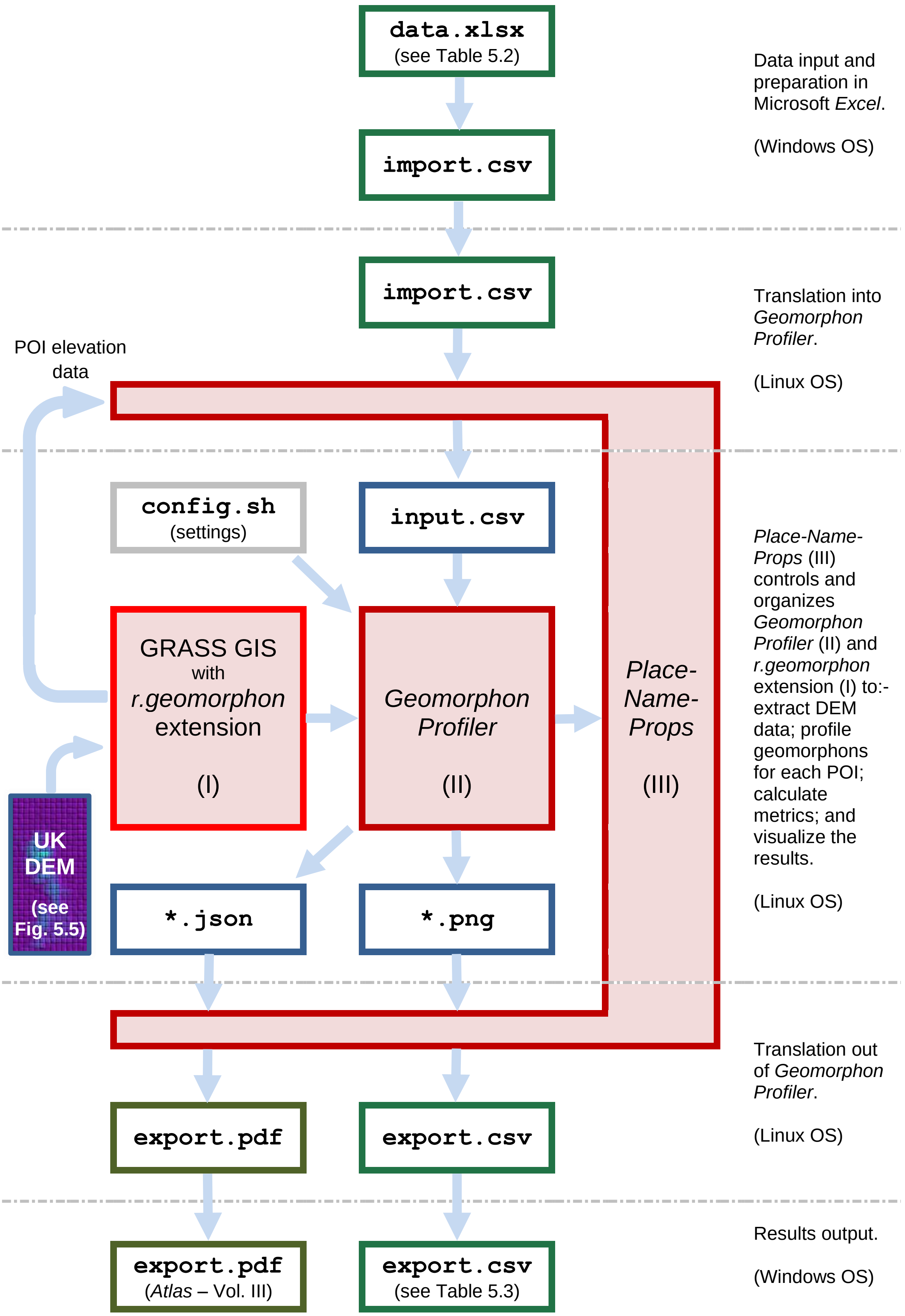


Fig. 5.4. *Extended Geomorphon* – inputs, outputs, and interactions of the three principle layers (I–III).

III. *Place-Name-Props* translates and transfers various formats of numeric and visualized data between different areas of the system to output: i) a spreadsheet of measurements, co-ordinates, and derived calculations, e.g. gradients; and ii) a formatted PDF atlas (see Vol. III).

This layered system begins and partially concludes in a Windows environment using Microsoft Excel, whereas the adapted and new processes operate in Linux, coded in C (the language of GRASS GIS 7.9 – Layer I), Python 3.6, POSIX shell scripts (Layers II and III), and HTML (for PDF generation – Layer III). WinSCP 5.17 (a freeware utility) is used to transfer files between the two operating systems (OS).[196] Fig. 5.4 provides an overview of the relationship between the three extended geomorphon layers (I, II, and III) and illustrates how the input source data (DEM) and POIs with their associated data interact to generate the software's outputs.

5.3.1 Extended Geomorphons – input

Once a co-ordinate system is specified, GRASS GIS 7.9 can utilize DEM source data.[197] To allow a POI to be specified anywhere in the United Kingdom (a necessity for the characterization of *LPN* relief-features – Chapter 6), OS data tiles (400 per 100 x 100 km grid square) had to be digitally linked (*mosaiced*) to create a seamless representation of digital elevations. Fig. 5.5 shows the stages by which 10,563 Terrain-5 DEM OS data tiles were mosaiced using a bespoke script to create a single DEM. Fig. 5.6 is a visual representation of these extracted data.[198]

[196] Downloadable from <https://winscp.net/eng/download.php>.
[197] Early in the adaptation process, Ovsienko was given able and generous assistance by astronomer and Cornish linguist, Davydh Trethewey <https://taklowkernewek.neocities.org>, who kindly shared valuable experience gained in reviewing *r.geomorphon* (Trethewey 2014). Trethewey also recommended the ALOS World 3D - 30m Version 3.1 dataset. As a third party not covered by Ordnance Survey Education Services Providers Licence 10002525, Ovsienko developed the adapted and new functionality of *r.geomorphon* for this thesis using the (less detailed) JAXA dataset.
[198] See *Data Sources* for details.

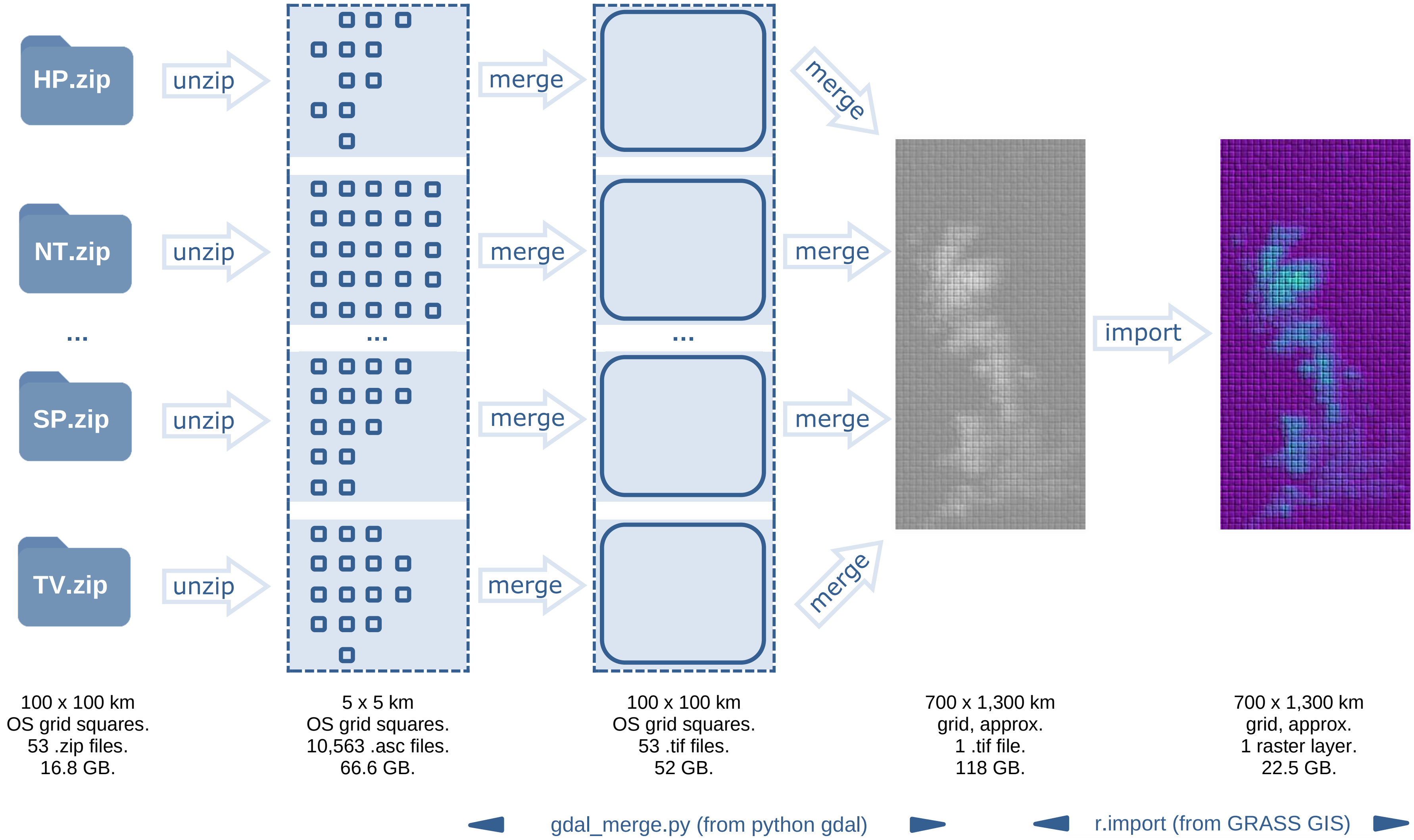


Fig. 5.5. The stages in *mosaicing* a single UK (DEM) dataset from 10,563 Terrain-5 DEM OS data tiles.

Fig. 5.6. Terrain-5 DEM OS tiles *mosaiced* to create a single UK (DEM) dataset.

The only requirement for the computation of individual geomorphon polygons and parameters is the POI of a target relief-feature (NGR_0), specified as a ten-digit NGR to which is prefixed two 100 x 100 km grid-square letters. The extended software converts this NGR into a numeric representation: NT 16219 83057 → 316219, 683057. Although only NGR_0 is mandatory, additional contextual information can be loaded simultaneously via an Excel spreadsheet (`data.xlsx`), saved as a comma-separated value (`.csv`) file in UTF-8 format (`import.csv`).

Column	Header	Contents
A	NGR_0	NGR of the POI (mandatory)
B	NGR_9	NGR of the co-appellative settlement (blank if no •S• exists)
C	•S• Name	settlement-name (blank if no •S• exists)
D	•S• Elevation	(blank – this is generated by the software)
E	•R• Name	relief-feature name
F	Parish / County	three-letter code
G	Etymology	etymology including language codes and sense indices
H	BWKR ID	*BWKR* record number[199]
I	co-app.	co-appellative code
J	Class	relief classification (*LPN* data only – Chapter 6)
K	Element	target hill-term
L	Section	atlas section code

Table 5.2. *Extended Geomorphon* input data fields.

These optional additional data (Table 5.2) will be re-attached after computation as part of the software's outputs. Word-processing features (including fonts and styles) are not preserved by the computation process and have to be restored separately by *Place-Name-Props*. Asterisks prefixed to NGRs, used in this study to signal an inferred rather than documented location or name, are tolerated by the extended software.[200] Once transferred to a Linux

[199] Etymologies and historical forms for Berwickshire place-names are available online by substituting the *BWKR* ID for '#' in the following URL: <https://berwickshire-placenames.glasgow.ac.uk/place-names/?p=record&id=#>.
[200] It has not been technically possible to mix italicized and non-italicized fonts in the same free-text fields of the *Atlas* (Vol. III); all titles have been italicized whereas all other names are not. Elsewhere, the convention of signalling obsolete and historical place-names with italics is respected. Again, for technical reasons, square brackets are replaced by parenthesis in the *Atlas*.

environment, *Place-Name-Props* translates the spreadsheet data (`import.csv`) to a format readable by *Geomorphon Profiler* (`input.csv` – Fig. 5.4).

5.3.1.1 POIs: Summits, *Highest Indicative Points*, and Settlement Zones

Hills and hill-spurs are composites of *land elements* (i.e. elementary forms – §5.2.1) and most frequently comprise several or even all of the acclivous geomorphon classes (PK, SP, RI, SH, and SL) in the one entity. As such, the extraction of a single geomorphon to characterise an entire relief-feature sits conceptually between land elements and landforms. It is beyond the scope of this thesis to profile hills as confections of multiple geomorphons, but a possible basis for such a future research project will be sketched in Chapter 8 (§8.1).

It could be argued the substitution of one geomorphon (usually the area surrounding the highest elevated point) in place of a group of perhaps several is unrepresentative of hills as they are generally conceived. Whilst freely admitting hills do constitute whole salient regions, the methodology of this study is an exploration of whether the attributes of summits, such as relative altitude and areal magnitude, are special – and comparable – factors of such salience. Notwithstanding the real complexities of hill-shape, I consider the quantification and comparison of hills by the automated characterization of their summits to be experimentally justifiable. Therefore, in attempting the following experiment, a 'what if…?' approach will be adopted.

The co-ordinates of the POI (NGR_0) are obtained manually from digital maps.[201] In the case of hills and ridges, the POI of a target relief-feature is defined as the point of maximum

[201] The reference implementation of *r.geomorphon* has a function that performs the unsupervised extraction of summits (Jasiewicz and Stępiński 2011, 6–7). This has not been tested, as in this study not every POI is a summit and not all summits are target relief-features. Digimap was the main online resource used in the compilation of NGRs. Google Earth also proved useful, especially for locating *LPN* examples (Chapter 6).

altitude. For some hill-spurs, especially those of the *hōh*-type, which have an independent summit, this point is also easily identifiable. The POI of declivous or level-topped hill-spurs is a matter of best approximation based on three criteria: a central location on the feature, which is situated proximal (in the anatomical sense) to the land mass of which it is a spur, and it must be the point at which the highest number of cardinal points (NGR$_{1–8}$) have a lower altitude than the POI – the aim being that this *highest indicative point* will generate a polygon that captures the largest possible area of the named feature. Where possible, this returns a geomorphon with seven out of the eight cardinals having a lower altitude (blue terminals) than the POI. Hill-spurs and slopes with less horizontal salience can have as few as five cardinals with lower altitudes.

The settlement zone location (NGR$_9$) is selected as the oldest identifiable habitational focal point. In practice, this could be an original parish church, or some other early locus such as a medieval fortification, a farmhouse, or a central area. Its inclusion is indicative but not necessary for the computation of the polygon, hence relief-features without co-appellative settlements (•R•<>^{u}S^{u} , etc.) are inputted with the settlement-data columns of `import.csv` left blank. The absence of these data triggers the header of the *Atlas* (Vol. III) to automatically show the name of the relief-feature instead of a settlement-name.

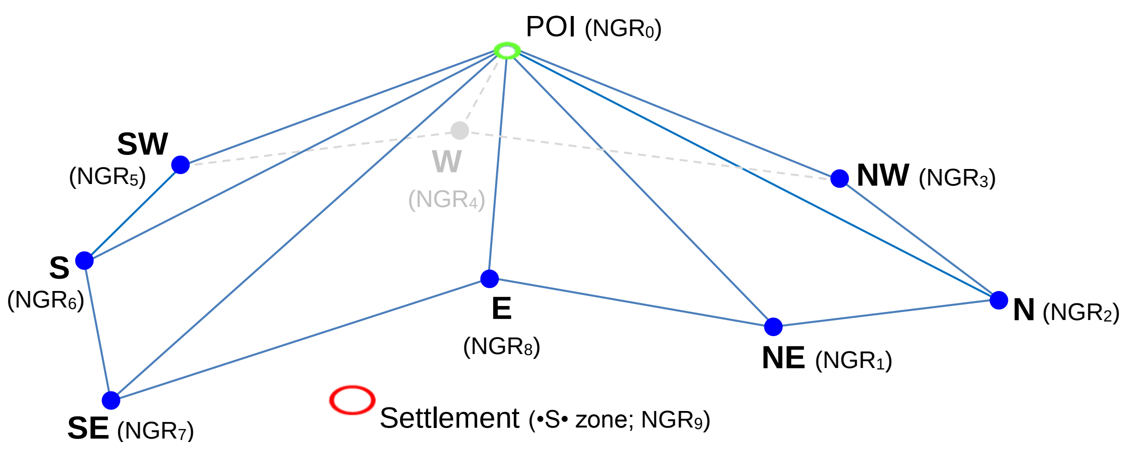


Fig. 5.7. A stereotypical geomorphon polygon of eight cardinal vertices, POI, and settlement.

5.3.2 Extended Geomorphons – processing

Geomorphon Profiler (Layer II) captures computations that were hitherto inaccessible to the user of *r.geomorphon*. Instead of translating a specified DEM area (raster) into a geomorphon map, the adapted and extended software allows the geomorphon of a single POI to be extracted and visualised as a polygon (Fig. 5.7). Although developed specifically for this thesis, these layers of programming comprise fully adaptable applications that could be put to a variety of other uses. Apart from the extraction of single geomorphons, the software also returns details of the geomorphon codes and the co-ordinates (NGR_{1-8}) of the polygon vertices, expressed as offset computed distances relative to the POI, together with the altitudes of these cardinal cells. These data are the basis upon which the computation of specific relief-feature parameters is performed.

It has been freely acknowledged that this prototype of toponymetry does not capture the nuances of a hill's shape or even the whole hill at times. Rather, the program extracts a significant section of terrain centred on the POI and radiating outwards until eight points are reached, at which aspect becomes sufficiently changed for *r.geomorphon* to register a difference of landform. Fig. 5.7 is a representation of how the commonest hill types are stereotyped by this process; dome-shaped hills and ridges in effect become eight-sided pyramids. Although such treatment simplifies and thus distorts hill-shape to varying degrees, it does so in a *consistent* way for every target relief-feature. Notwithstanding this limitation, the software does permit the rapid and consistent automated characterization of very large datasets containing multiple hill-terms as a first step towards possible refinements to the methodology. A 2.60 GHz laptop computer (CPU i5-3320M with 8 GB RAM) running in Linux, was able generate outputs for 1,502 relief features, located across Britain, in 1:15:44 hours at an approximate rate of 3.3 seconds per hill.

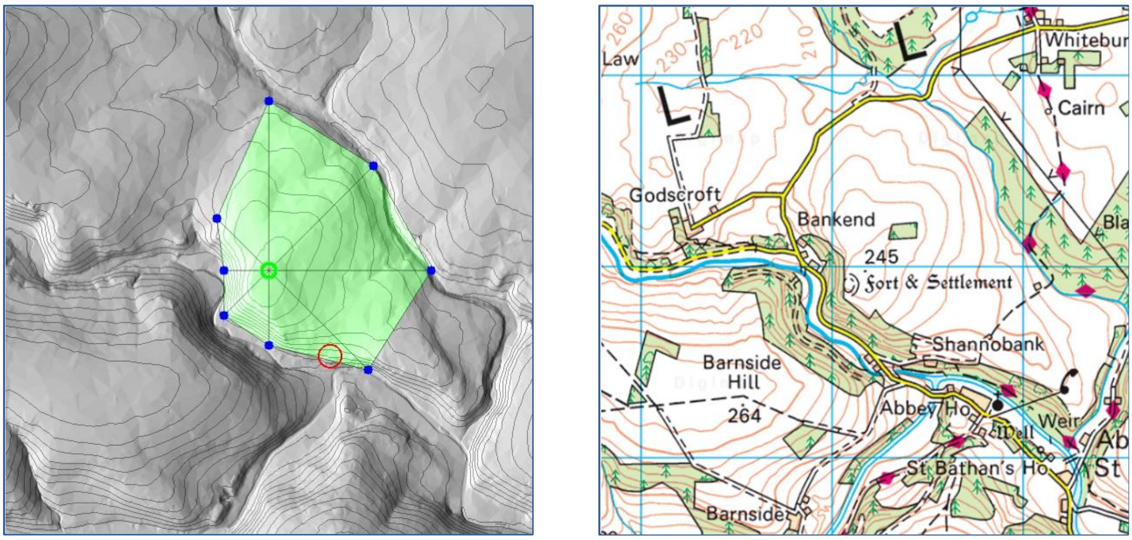


Fig. 5.8. *Geomorphon Profiler* image vs. OS map[202] of Shannabank Hill ASB NT 75181 63003.

5.3.3 Extended Geomorphons – output

Place-Name-Props (Layer III) reinterprets the JSON files generated by *Geomorphon Profiler* (Layer II) and combines these with project-specific data (Table 5.2) to output simultaneously:

1. a spreadsheet (`export.csv` – not illustrated) comprising 77 columns of geomorphon data and derived computations for each POI (NGR$_0$) along with the reassembled input data (from Table 5.2). Selected values (Table 5.3) are reproduced as a table of parameters in Vol. III (`export.pdf`);[203]

2. a paginated PDF file (`export.pdf`) with user-defined section breaks (Vol. III). This geomorphon atlas automatically combines three single geomorphon images per page and pairs each with a table of parameters and contextual information.

[202] © Crown copyright and database rights 2020 Ordnance Survey (100025252), original scale 1:25,000. Version in Roam: October 2019, using: EDINA Digimap Service, <https://digimap.edina.ac.uk>, accessed 26 November 2020.
[203] The data not reproduced in the *Atlas* include: NGR$_{1–8}$; the altitudes of NGR$_{1–8}$; and the distances from NGR$_0$ to NGR$_{1–8}$; as well as more experimental metrics from the reference version of *r.geomorphon*, which were considered for inclusion but not utilized ultimately (*elongation*, *azimuth*, *intensity*, and *exposition* – Jasiewicz and Stępiński 2011, 5).

Geomorphon Profiler (Layer II) outputs directly:

3. individual PNG image files (`*.png`) depicting NGR_0 (as a bright green ring at the centre of a 1.5 km search-radius), and the spatial extent of the geomorphon polygon as a green shaded area. These are superimposed onto a DEM-derived relief-contour map layer. A zone, central to the settlement (NGR_9, shown as a red ring), is added if it is located within the map area (approximately 2 x 2 km, centred on the POI) as shown in Fig. 5.8 (left).

The individual Berwickshire sections of the *Atlas* (Vol. III) are arranged alphabetically by hill-term and then by settlement-name, with the exception of BWK3.4 in which the relief-feature name is substituted (there being no associated settlements for this group):

BWK3.1	First Degree Co-appellatives
BWK3.2	Second Degree Co-appellatives
BWK3.3	Collocated Co-appellatives
BWK3.4	Relief-features without Co-appellative Settlements
BWK9	Unsuccessful Geomorphons (§5.5.1)

This division could permit the degrees of inference applied in constructing the corpus to be evaluated separately (§4.2.3–§4.2.3.4). BWK3.4, viewed in isolation from co-appellative formations, offers a control against which to measure whether differences exist between topographical settlement-names and relief-feature names in the application of hill-terms. *Appendix K* (BWK3) serves as an alphabetical index of place-names for the Berwickshire section of the *Atlas* as well as for *Appendix I* (BWK1) and *Appendix J* (BWK2) which are arranged alphabetically by hill-term. Table 5.3 lists the outputted data fields (`export.csv`) reproduced in the *Atlas* (`export.pdf`).

Ovsienko's software will be applied to the Berwickshire corpora (BWK1 and BWK2) to generate unsupervised parameters and images. These will then be analysed for patterns of statistical dispersion to test whether congruence of attributes generates categories that correlate with the generic elements in relief-feature names. Before reviewing the results of this process, an overview of the parameters themselves will first be given.

Column	***Header***	***Contents***
A	•R•	NGR_0 (the POI of the relief-feature)
B	•S•	NGR_9 of the co-appellative settlement
C	•S• Name	settlement-name
D	•S• alt. (m)	settlement altitude
E	•R• Name	relief-feature name
F	Parish / County	three-letter civil parish (SCO) or county (ENG) code
G	Etymology	etymology including language codes and sense indices
H	BWKR ID	*BWKR* record number, for appending to the URL
I	co-app.	co-appellative code
J	Class	relief classification (*LPN* data only)
K	Element	target hill-term
L	Section	atlas section code
M	Row Order	an ordinal by which to resort the rows of `import.xlsx`
N	•S•to•R• dis. (m)	distance between settlement and the relief-feature
O	•R• alt. (m)	relief-feature altitude
R	G10 Number	10-level geomorphon code
S	G10 Code	10-level geomorphon (landform) name
U	G498 Number	498-level geomorphon code
V	G6561 Number	6,561-level geomorphon code
Y	wid. (m)	relief-feature width
Z	len. (m)	relief-feature length
AC	pro. (m)	relief-feature topographical prominence
AG	per. (m)	relief-feature perimeter length
AH	sur. (m^2)	relief-feature surface area
AI	mesh per. (m)	relief-feature mesh perimeter length
AJ	mesh sur. (m^2)	relief-feature mesh surface area
AK	•S•to•R• gra. (%)	settlement to relief-feature gradient
	(Excel row #	atlas record #)

Table 5.3. Selected data outputs (`export.csv`) upon which statistics will be based.

5.4 Parameters

All parameters are generated by the extended software from two inputs: the POI of the relief-feature (NGR_0) and the locus of the co-appellative settlement (NGR_9). In the case of singleton relief-features, only NGR_0 is required. If the NGR_9 field is blank the parameters relating to a settlement will not compute and the associated outputs also remain blank.

5.4.1 Horizontal Parameters

- **length (len.)** = the longer side (m) of a rectangle of best-fit to the polygon.[204]
- **width (wid.)** = the shorter side (m) of a rectangle of best-fit to the polygon.
- **perimeter (per.)** = the sum of the distances (m) between the eight vertices of the geomorphon polygon ($NGR_{1–8–1}$), measured two-dimensionally '2D', i.e. with vertices at equal altitudes.
- **mesh perimeter (mesh per.)** = the sum of the distances (m) between the eight vertices of the geomorphon polygon ($NGR_{1–8–1}$), measured two-and-a-half-dimensionally '2.5D', i.e. with vertices at computed altitudes.
- **settlement to relief-feature distance (•S•to•R• dis.)** = the 2D distance (m) between the relief-feature (NGR_0) and the settlement (NGR_9).

5.4.2 Vertical Parameters

- **relief-feature altitude (•R• alt.)** = the altitude (m) of NGR_0.
- **relief-feature topographical prominence (pro.)** = the altitude (m) of NGR_0 less the minimum vertex altitude (m) – only applicable to the geomorphon PK (*peak*).

[204] See Fig. 5.3 where this feature is illustrated with the label 'rotated bounding box'.

- **settlement altitude (•S• alt.)** = the altitude (m) of the NGR_9.
- **settlement to relief-feature gradient (•S•to•R• gra.)** = the gradient (%) of a 2.5D straight line between the settlement zone (NGR_9) and the relief-feature (NGR_0).

5.4.3 Areal Parameters

- **relief-feature surface area (sur.)** = the area (m^2) within **perimeter (per.)**.
- **relief-feature mesh surface area (mesh sur.)** = the sum of the areas (m^2) of the eight mesh triangles as depicted in Fig. 5.7.

5.4.4 Geomorphon Codes

The *Atlas* and `export.csv` data fields R, S, U, and V (Table 5.3) present geomorphon codes at three levels of decreasing rationalization (1/10, 1/498, and 1/6,561 – §5.2.2.1) with a two-letter landform code corresponding to the 10-level, e.g. 'RI 03 0008 4376' is a *ridge* equal to code 3 at the 10-geomorphon level, code 8 at the 498-level, and code 4,376 at the 6,561-level.

5.5 Toponymetric Analysis of Berwickshire Data

The legitimacy of admitting non-Old English elements to an evaluation of the GCH was explored in Chapter 2. The different linguistic histories either side of the Anglo-Scottish border are such that Berwickshire hill-terms and those examined by *LPN* only partially overlap. Place-names of demonstrably Old English origin are not abundant in the study area, so restricting a comparison between *LPN* and Berwickshire to elements specifically referenced by Gelling and Cole would limit the scope of investigation unnecessarily. A pragmatic and flexible solution, therefore, is to presume the chronological gaps in the continuity of elements between Old English (<1100) and Middle Scots (1450–1700) can be bridged. Thus, whilst remaining mindful a given language label may mask greater chronological depth, the rationale adopted here will use Scots language place-names of all periods and compare them with the Old- and Middle English elements from which they ultimately derive (§1.4.2.1). This approach, echoing *HPND* (pp. 41–43), seeks to be experimental since such labels (following the chronology of Aitken 1985 (2015)) essentially reflect the earliest known sources rather than categorically affirming a language / language-stage of origin in each case. With the chronological boundary between Old English and Early Scots poorly documented and problematic to define, the choice of 1100 as the date of transition is an arbitrary cut-off point for methodological purposes.

Brittonic (1)	**ros* (1)
Early Scots (1)	*bell* (1)
Old English (1)	*bune* (1)
Scots (10)	*bank* (7), *bell* (2), *brae* (4), *clint* (1), *dod*^{1} (3), *dod*^{2} (3), *drum* (1), *knock* (2), *ross* (1), *snuke* (1), *steel* (1)
Scottish Standard English (5)	*bank* (12), *bell* (1), *brae* (19), *craig* (7), *point* (8)

Table 5.4. Berwickshire hill-terms (BWK1 and BWK2) without *LPN* equivalents, tallied by element and toponym.

Table 4.13 summarized the 490 Berwickshire place-names with established etymologies that are available to test the GCH. These are detailed in *Appendix I* (BWK1) and *Appendix J* (BWK2). Together, this Berwickshire corpus contains 57 hill-terms, four of which have two connotations, resulting in a tally of 61 senses.[205] Table 5.4 lists 18 hill-terms (found in 76 toponyms), for which *LPN* does not include comparable equivalents. These will be processed to compute the 11 toponymetric parameters. However, the low incidence of testable examples per hill-term precludes their use to support meaningful statistical conclusions.

[205] ESc **clif*^{2}, ESc **clif*^{3}; Sc *dod*, Sc *dod*^{2}; OE *hōh*, OE *hōh*^{2}; OE *nes*, and OE *nesu*. See Table 4.7 for sense definitions.

LPN		BWK1 and BWK2	
Brit *blakno-*	7	Br **blajn*	1
Brit *breȝ, brig*	14	Br **bre*	1
Brit *brinn, bryn*	5	Br **brïnn*, Br **brun*	2
OE *camb*	4	Sc *kame*	4
OE *clif*	140	ESc **clif*^{2}, ESc **clif*^{3}	4
OE *cnoll*	23	ESc *knoll*, Sc *knowe*, SSE *knowe*	31
OE *dūn*	358	OE *dūn*, ESc *doun*, Sc *doun*, (G *dùn*, Br **dīnas*)[206]	11
OE *ecg*	15	Sc *edge*, SSE *edge*	3
OE *hēafod*	60	ESc *heved*, Sc *heid*, SSE *head*	5
OE *hlāw*	66	OE *hlāw*, ESc *law*, Sc *law*, SSE *law*	113
OE *hōh*	155	OE *hōh*, OE *hōh*^{2}, ESc *huch*	8
OE *hrycg*	72	ESc *rig*, Sc *rig*, SSE *rig*, SSE *ridge*	73
OE *hyll*	180	OE *hyll*, Sc *hill*, SSE *hill*	129
OE *næss*, *ness*	43	OE *nes*, OE *nesu*, Sc *nes*	5
OE *pēac*, *pīc*	16	SSE *pike*	1
OE *sīde*	17	OE *sīde*, ESc *side*, Sc *side*, SSE *side*	23
	1,175		**414**

Table 5.5. Tally of equivalent *LPN* and Berwickshire tests per element.

Table 5.5 details 16 bands of 39 elements occurring in 414 Berwickshire toponyms that are potentially comparable with the 1,175 examples examined under the section headings of *LPN*. Such banding allows language labels to be compared separately, or considered as a continuum, without assumptions about chronology or possible differences of semantic range. The nature of the *LPN* corpus will be examined in Chapter 6. At this stage, as had been noted, the main focus of *LPN* is Old English and Old Norse elements in English place-names, whereas the earliest sources available to *REELS* and previous Berwickshire studies (§3.2) largely correspond to the period of Middle English (1100 to 1475) or frequently even later (§3.1.2.1).[207]

For the remainder of this chapter the results of applying toponymetry to the Berwickshire corpus in isolation will be described. The eventual aim is to finalise a sub-set of 'successful'

[206] See §5.5.2 and §7.3 on the inclusion of these alternative Celtic etymologies for Duns DNS.

[207] The only Berwickshire toponyms of possible Old Norse origin happen not to evidence hill-terms. These are: Corsbie LEG •S• NT 60759 43840 ON2 *kross* + ON2 *bý(r)*, which may 'represent a later, analogical formation rather than a name created by speakers of Old Norse' (*BWKR*, s.v.); and *Skateby(e)* (*BONG*, 155; Nicolaisen 1976, 114 '*Schatteby*').

Berwickshire hill-terms – success being defined as measurability – that can then be used to determine whether a statistically significant correlation exists between parameters and elements. To that end, tests will be performed to investigate two related questions:

> Test 1: Can all elements be successfully measured using toponymetry, and if not, which elements might be evaluated and compared with examples from *LPN*?
>
> Test 2: When Berwickshire relief-features with well-supported etymologies are assessed with toponymetry do they display a non-random relationship between hill-term and landform?

5.5.1 Test 1 – Computation success or failure

It is essential to examine whether a new methodology performs as anticipated. Although the outputs of toponymetry are consistent as regards the functioning of the software, it is immediately apparent that geomorphon polygons capture more or less of the terrain than might be expected. Most commonly, two kinds of error present, which occasionally combine to manifest in the same image:

***Curtailed* polygons** – one or several of the cardinal computations completely fails or falls short, sometimes without a perceptible change of terrain aspect that would have triggered the computation in that outward direction to cease (§5.2.2). However, in Fig. 5.9 (left), the destruction of the hill is all too apparent. Often such failures appear with cardinal points located proximally or conterminous with the POI. When failure is due to a nearby acclivity, red geomorphon terminals are depicted, which would normally indicate not a hill but one of the five declivous landforms (§5.2.2.1). This can be verified by referring to the geomorphon code letters for that image. Clustering of itself is not necessarily an indication of computation failure, since relatively small and/or steep relief-features will correctly have this presentation.

The contour lines of OS maps and DEMs usually provide pointers to the most probable cause.

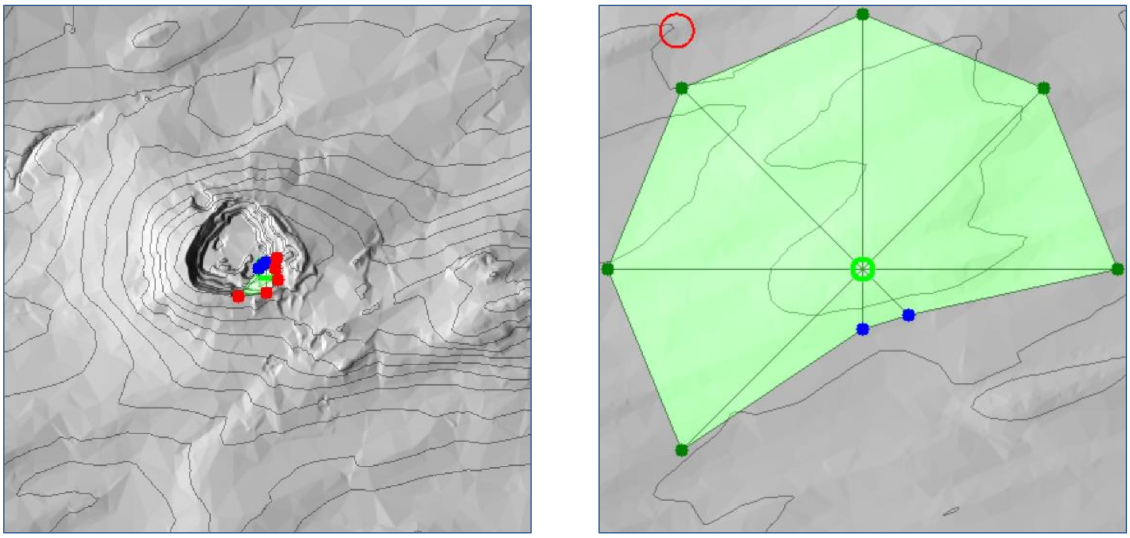


Fig. 5.9. Computation failures: Redpath Hill EAR (left) *curtailed* by quarrying. Swinton Hill SWN (right) *distended* by very low topographical salience.

A common issue, alluded to already, is that geomorphons are negatively impacted by both natural and anthropogenic terrain anomalies. Likely obstacles can sometimes be recognized and avoided when selecting the POI, but this is not always feasible. For example, the ramparts of hill-forts – a very frequent occurrence in Berwickshire – are usually sited for defensive reasons on the summits of hills. If the DEM registers their presence, the software will often terminate its computations when the earthwork is reached; a POI at the centre of detectable ramparts can even return a geomorphon of PT (*pit*), i.e. all eight (red) cardinals are higher than the POI. In practice, the actual effect of such anomalies can be difficult to predict. The OS map in Fig. 5.8 (right) shows just such an earthwork near the summit of Shannabank Hill ASB, but the computed polygon of the *Atlas* image (left) is entirely unaffected by the hill-fort at NT 75091 62915. Contrast this with Horseley Hill CHM (Fig. 5.10) for which it has proven impossible to generate an uncurtailed polygon due to the presence of a substantial hill-fort.

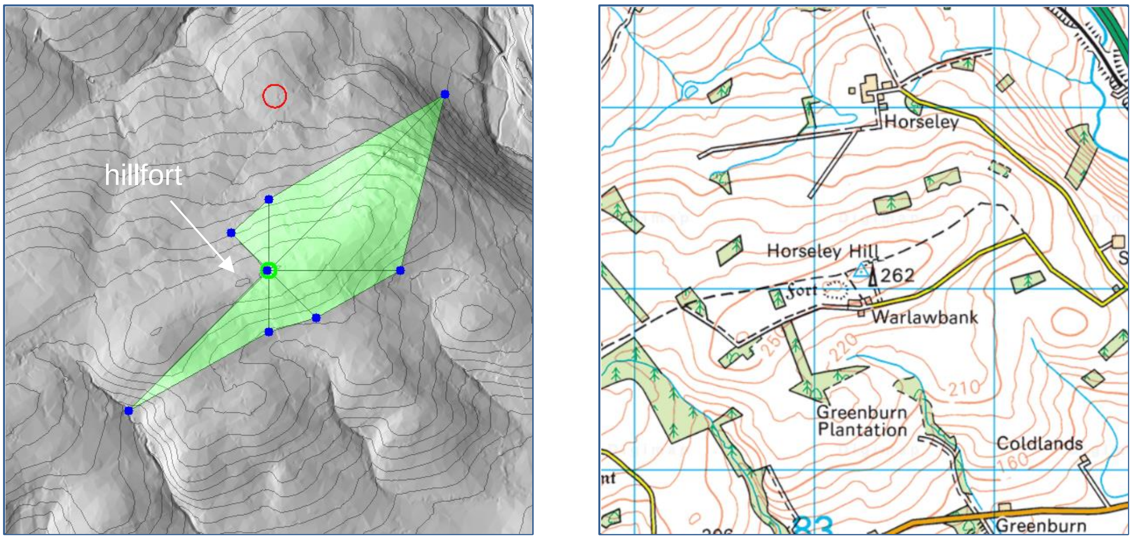


Fig. 5.10. Horseley Hill CHM NT 83248 62078. *Geomorphon Profiler* image vs. OS map.[208]

***Distended* polygons** – if the user-defined parameters of *flat* and *dist* are incorrectly specified, or the terrain is naturally very level, minor changes of gradient will go undetected (Fig. 5.9, right). Extensive level landscapes devoid of water or ice erosion are a rarity, so green geomorphon terminals (§5.2.2) forming the vertices of a regular octagon at the limit of the search radius are cause for suspicion. There is almost always a water boundary of some description within 1,500 m of a POI. Depending on the scale of the DEM, a large area of coastal marshland, for example, can result in a perfect octagon without the detection of an elevation boundary in all eight directions. The same occurs if a POI is erroneously specified more than 1.5 km offshore.

To minimise the number of curtailed or distended computations, unsuccessful images need to be manually set aside, and their POIs reviewed to regenerate images using a range of values for *skip*, and *flat* (§5.2.2). Only once this experimentation has ceased to be productive are the POIs of the unsuccessful remainder reconsidered and adjusted where practicable. If an obstruction seriously impacts the line-of-sight computation of the summit (or *highest indicative point* – §5.3.1.1), or if the OS map (raster) is at odds with the more

[208] © Crown copyright and database rights 2020 Ordnance Survey (100025252), original scale 1:25,000. Version in Roam: October 2019, using: EDINA Digimap Service, <https://digimap.edina.ac.uk>, accessed 21 March 2021.

accurate DEM depiction, the NGR can be manually adjusted by a few meters and the program repeatedly rerun until the largest number of preventable failures are eliminated through trial and error.

Eventually however, it becomes apparent that some individual relief-features cannot be measured using this prototype of toponymetry, either due to their nature or perhaps because of terrain modification. It is also possible in rare cases that a hill-term has been misattributed, despite the care taken to eliminate this possibility by toponymic triage (§4.2.1–§4.2.6). Nevertheless, unsuccessful polygon computations still have a value for clarifying where improvements might be targeted in future iterations of the software. They also suggest whether specific hill-terms are generally less amenable to investigation using the current combinations of DEM data, software, and the siting of POIs. It would be interesting, for example, to contrast the rates of success between DEM data (as used in this study) and more accurate LiDAR surveys. To avoid distortion in the calculation of normal distributions, parameters for unsuccessful polygons will be excluded from the calculation of statistics.

The main objective of Test 1 is to eliminate aberrant computations and any that clearly do not reflect even a stereotypical representation of the relief-feature in question. In terms of the length and breadth of a hill, it should be borne in mind that these particular parameters are based on a rectangle of best fit to the polygon. Thus, although the surface area will be reduced by the failure of a single computation (e.g. the W cardinal (NGR_4) of Horseley Hill CHM – Fig. 5.10), the horizontal dimensions do represent a maximum approximation of the relief-feature. A further aspect that will emerge with Test 2 is that each of the 11 parameters (§5.4.1–§5.4.4) are evaluated separately, and therefore errors in the computation of geomorphons return erroneous values only for the parameters affected. Indeed, four are computed independently of geomorphon polygons: the altitudes of the relief-feature and settlements (•R• alt.; •S• alt.), and the distance and gradient between them (•S•to•R• dis.; •S•to•R• gra.). Thus, if perimeter length and area are impacted by failures in one or several of the cardinal directions, altitudes, for example, remain reliable and directly comparable with those of successful polygons.

5.5.1.1 Test failure frequency

Unsuccessful geomorphon computations are retained and gathered into the BWK9 section of the *Atlas*. Of 490 toponyms tested, 134 (27%) failed to produce polygons that capture the terrain due to curtailed and/or distended computations. Table 5.6 details the number of failures per element and ranks these by percentage. The small sample sizes from which some of these results derive make it unsafe to generalise onto the wider population of such names, but the raw rates of failure do give a general impression that some elements appear less amenable to toponymetry by the current method.

Low topographical salience undoubtedly underlies the unsuccessful computation of around half the Berwickshire place-names with $_{\mathrm{SSE}}$ *bank*, $_{\mathrm{SSE}}$ *brae*, and $_{\mathrm{Sc}}$ *rig*. A similar rate applies to $_{\mathrm{Sc}}$ *side*, thereby confirming researcher experience that determining the POI of slope-terms (i.e. parts of relief-features) is often much more problematic than selecting the summits for ridge-terms and hill-terms. The difficulty in quantifying places with the element $_{\mathrm{SSE}}$ *craig* suggests another issue with the methodology is that very uneven surfaces adversely impact the success rate. This phenomenon has been noted in respect of the interference caused by terrain destruction and modification, but natural ruggedness also accounts for the frequent failure of elements such as $_{\mathrm{SSE}}$ *point*, which predominate along the rocky Berwickshire coastline. For just this reason, toponyms from the very uneven terrain in the hinterland of St Abbs Head CHM features frequently in the BWK9 section of the *Atlas* where a broad range of different elements is affected.

Although it is disappointing that 27% of the combined BWK1 and BWK2 corpora cannot be used to generate representative statistics, thereby reducing the samples available for 29 of the 61 element senses collated, the fact a standardized procedure returns markedly uneven rates of failure actually supports the premise that hill-terms are not randomly assigned but may in actuality be systematic in some way. Whilst only a general indicator, this negative deduction does constitute slight evidence in support of the GCH.

Element	***No. of Tests***	***Failed***	***Failed %***
Sc *drum*[1]	1	1	100
Sc *edge*[1]	1	1	100
SSE *edge*[1]	2	2	100
Sc *heid*[1]	1	1	100
Sc *kame*[1]	4	4	100
Sc *dod*[2]	3	2	67
SSE *bank*[1]	12	6	50
Sc *knock*[1]	2	1	50
SSE *ridge*[1]	4	2	50
ESc *rig*[1]	2	1	50
Sc *side*[1]	8	4	50
OE *sīde*[1]	4	2	50
SSE *brae*[1]	19	9	47
Sc *rig*[1]	44	20	45
SSE *craig*[1]	7	3	43
ESc *law*[1]	14	5	36
ESc *knoll*[1]	3	1	33
Sc *knowe*[1]	12	4	33
ESc *side*[1]	6	2	33
SSE *knowe*[1]	16	5	31
SSE *rig*[1]	23	7	30
Sc *brae*[1]	4	1	25
SSE *point*[1]	8	2	25
Sc *hill*[1]	26	6	23
Sc *law*[1]	58	13	22
SSE *hill*[1]	101	21	21
SSE *side*[1]	5	1	20
SSE *law*[1]	36	6	17
Sc *bank*[1]	7	1	14
	433	**134**	

Table 5.6. Berwickshire test failure frequency (ranked by percentage).

Around a third of $_{\text{ESc}}$ *knoll* / $_{\text{Sc}}$ *knowe* / $_{\text{SSE}}$ *knowe* also fail, suggesting again that low salience of altitude and/or area may be contributary factors, but this would require further research with larger data samples to determine whether this group is particularly prone to fail. Nevertheless, two thirds of the place-names in $_{\text{ESc}}$ *knoll* / $_{\text{Sc}}$ *knowe* / $_{\text{SSE}}$ *knowe* (hereafter referred to as KNOWE – §5.5.2) that are successful do provide a useful sample against which to evaluate the characteristics of $_{\text{OE}}$ *cnoll* in Chapter 6.

Table 5.6 shows that not all hill-terms can be successfully measured using toponymetry, and although only five fail outright this might be due to very low sample size in those particular instances. Two elements require comment since they stand out as fundamentally different from hill-terms in general. The features named with $_{\text{Sc}}$ *kame* refer to eskers, whose sinuous outlines would probably require quantification by a wholly different approach, perhaps akin to that for rivers, with which they naturally share many features due to their origin. And somewhat ironically in terms of an exercise that looks to define terrain boundaries, the elements $_{\text{Sc}}$ *edge* and $_{\text{SSE}}$ *edge* are themselves problematic to measure because they designate not one landform separate from another but the intersection of two. Gelling and Cole observe relief-features in $_{\text{OE}}$ *ecg* have the unusual characteristic of often 'being named from a nearby settlement' (*LPN*, 174) instead of in parallel, which is the premise regarding co-appellative formations (§4.2.3). Hill-terms-as-boundaries, it would appear, are a special case since they denote not an object but an interface of two types of relief. In this, $_{\text{Sc/SSE}}$ *edge* resembles other members of this class of near vertical hill-terms such as $_{\text{SSE}}$ *cliff*, $_{\text{Sc}}$ *heuch*, and frequently $_{\text{Sc}}$ *craig* (see Table 4.7, inadmissible senses).

5.5.2 Test 2 – Element and hill-shape comparison

Although parameter values and images for the remaining 52 hill-terms can be generated and contrasted, it should be noted that only the Berwickshire test-equivalents of $_{\text{OE}}$ *cnoll*, $_{\text{OE}}$ *hlāw*,

$_{\mathrm{OE}}$ *hrycg*, $_{\mathrm{OE}}$ *hyll*, and $_{\mathrm{OE}}$ *sīde* have a sample size greater than 10, and of the elements without a *LPN* equivalent only $_{\mathrm{SSE}}$ *bank* and $_{\mathrm{SSE}}$ *brae* satisfy this threshold. Therefore, whilst comparisons could be made between the 15 remaining bands of Table 5.5 ($_{\mathrm{Sc}}$ *kame* having been eliminated by Test 1) it is only these five that have adequate sample membership to test the GCH using a statistical model of hypothesis testing. For brevity and convenience, superordinate terms (in capitals) will be used henceforth to refer to language continua and where multiple senses are conflated. E.g. SIDE = $_{\mathrm{OE}}$ *sīde*, $_{\mathrm{ESc}}$ *side*, $_{\mathrm{Sc}}$ *side*, and $_{\mathrm{SSE}}$ *side*; RIG = $_{\mathrm{ESc}}$ *rig*, $_{\mathrm{Sc}}$ *rig*, $_{\mathrm{SSE}}$ *rig*, $_{\mathrm{SSE}}$ *ridge*; etc. The superordinate DOUN ($_{\mathrm{OE}}$ *dūn*, $_{\mathrm{ESc}}$ *doun*, $_{\mathrm{Sc}}$ *doun*, $_{\mathrm{G}}$ *dùn*, $_{\mathrm{Br}}$ **dīnas*) includes two alternative Celtic etymologies for a single place-name, Duns DNS, which is most likely to derive from the plural of $_{\mathrm{OE}}$ *dūn*. Their inclusion is entirely experimental to observe whether these elements fall (in this instance) within the same range as $_{\mathrm{OE}}$ *dūn* (§7.3) despite having a slightly different connotation and origin in all probability (*LPN*, 140–141).

Therefore, determining whether the GCH operates in Berwickshire (Research Question 1) will focus on seven superordinate groupings which correspond to Table 5.5: BANK (12), BRAE (13), HILL (102), KNOLL (21), LAW (88), RIG (43), and SIDE (14).[209] As $_{\mathrm{OE}}$ *clif*, $_{\mathrm{OE}}$ *dūn*, and $_{\mathrm{OE}}$ *hōh* are strongly represented in the *LPN* datasets, CLIF (4), DOUN (11)[210], and HUCH (8) will also be examined as a sub-group of three to test whether the hill-terms they represent behave similarly.

[209] The number in parenthesis is the remaining sample size based on successful geomorphon computation.
[210] Although DOUN has 11 tests, these relate to seven loci, which falls below the level of statistical reliability (10).

5.5.2.1 Statistical Hypothesis Testing

The *Atlas* (Vol. III) is a segmented sample of quantifiable landforms evidencing verified generic elements across 11 parameters (§5.4.1–§5.4.3).[211] The data included there will now be investigated. Gelling and Cole's claim a systematic relationship between hill-terms and landforms exists will be tested using a statistical model based on this sample. Therefore, inferences regarding the *population* of Berwickshire place-names relative to the GCH will test that a relationship between landforms and grouped hill-terms is not random.

Both here, and in Chapter 6, the GCH is considered the *alternative hypothesis* (H_1) – its historical role in the development of English place-name research – whilst the non-systematic incidence of topographical elements will constitute the *null hypothesis* (H_0). Thus, formally $H_0 \neq H_1$:

H_0 : settlement-names were coined randomly from hill-terms

H_1 : settlement-names were not coined randomly from hill-terms

For the null hypothesis to be rejected with a 99% level of confidence ($C = 0.99$), the *level of significance* (α) will be 0.01 ($C + \alpha = 1$). As the power of a statistical test decreases with < 30 samples, it is important to select a method sensitive to this characteristic of some element groupings within the Berwickshire sample. Equally critical is the necessity to anticipate whether these data meet the assumption of normality, i.e. the mean, median, and mode are equal and appear centred at zero on the bell-curve when graphed. A Shapiro-Wilk Test of normality is performed as an adjunct to the main statistical test (outlined below). This confirms that the majority of the 11 parameters for most of the 7 + 3 test groups (§5.5.2) are abnormally distributed. Table 5.7 details the results of each individual test; values for abnormal distributions are shown in **red** and borderline values in **orange** (1 = normal). This

[211] In completing the following analysis, two sources of statistical expertise and training have been invaluable: Charles Zaiontz's 'Real Statistics Using Excel' <www.real-statistics.com>; and Jason Gibson's 'Math and Science.com' <https://www.mathtutordvd.com>.

convention also applies in the results sections (§5.6.1–§5.6.11; §6.3.1–§6.3.8; and §6.4.1–§6.4.8).

	BANK	*BRAE*	*HILL*	*KNOLL*	*LAW*
len.	0.42	**0.033**	**0.036**	**4.5 × 10^{-4}**	**0.007**
wid.	0.12	**0.0042**	**0.012**	**2.4 × 10^{-4}**	**0.0028**
per.	0.37	**0.02**	**0.025**	**4.3 × 10^{-4}**	**0.0085**
mesh per.	0.37	**0.029**	**0.026**	**4.3 × 10^{-4}**	**0.0085**
•S•to•R• dis.	**0.075**	0.78	**0.001**	1	**1.1 × 10^{-4}**
•R• alt.	**0.047**	**0.014**	**0.0032**	**0.056**	**3.7 × 10^{-4}**
pro.	0.9		**0.008**	0.21	**0.0013**
•S• alt.	0.97	1	**0.031**	1	**0.011**
•S•to•R• gra.	0.87	0.19	0.49	1	**0.0018**
sur.	**0.0024**	**9.1 × 10^{-4}**	**2.7 × 10^{-6}**	**7.2 × 10^{-6}**	**4.9 × 10^{-6}**

	RIG	*SIDE*	*CLIF*	*DOUN*	*HUCH*
len.	**0.0012**	0.11	1	**0.082**	**0.05**
wid.	**1.3 × 10^{-4}**	0.39	0.92	**0.021**	**0.027**
per.	**2.4 × 10^{-4}**	0.55	0.42	**0.085**	**0.083**
mesh per.	**2.4 × 10^{-4}**	0.54	0.43	**0.084**	**0.087**
•S•to•R• dis.	**1.1 × 10^{-4}**	**0.059**	**0.049**	0.65	0.16
•R• alt.	**1.2 × 10^{-4}**	0.11	0.43	0.28	**0.065**
pro.	**3.1 × 10^{-5}**	0.16	1	**0.043**	0.14
•S• alt.	**7.8 × 10^{-4}**	0.79	0.49	0.1	0.12
•S•to•R• gra.	0.55	0.28	**0.067**	0.4	0.86
sur.	**5.9 × 10^{-6}**	**0.014**	0.96	0.12	**0.044**

Table 5.7. Shapiro-Wilk test of Berwickshire data normality (by test group and parameter).

Although the more powerful One-way Analysis of Variance (ANOVA) test would have been preferable to use had normally distributed samples ≥ 30 been available, non-normal data and small sample size dictate that the non-parametric Kruskal-Wallis Test should be the method of choice.[212] One Way ANOVA plus the post-hoc Tukey HSD test (which identifies which ANOVA variances are significant) were conducted as an experiment using a section of the Berwickshire test data but without an appreciable improvement in results. On balance, the Kruskal-Wallis Test was judged a more conservative choice. This particular method

[212] For details, see <https://www.real-statistics.com/one-way-analysis-of-variance-anova/kruskal-wallis-test>.

allows two or more groups to be compared by their medians (instead of by means or standard deviations) and it uses a ranking of data points rather than the actual data values (hence 'non-parametric').

The Kruskal-Wallis Test statistic (H) is calculated:

$$H = \frac{12}{n(n+1)} \sum_{j=1}^{k} \frac{R_j^2}{n_j} - 3(n+1)$$

where k = the number of groups, n_j is the size of the jth group, R_j is the rank sum for the jth group and n is the total sample size, i.e.

$$n = \sum_{j=1}^{k} n_j$$

Then

$$H \sim \chi^2(k-1)$$

provided $n_j \geq 5$ based on the following null hypothesis:

H_0: The distribution of scores is equal across all groups.[213]

This method uses the chi-squared (χ^2) distribution, which has a positive skew and a tail to the right (Fig. 5.11), reflective of the number of groups (k) examined.

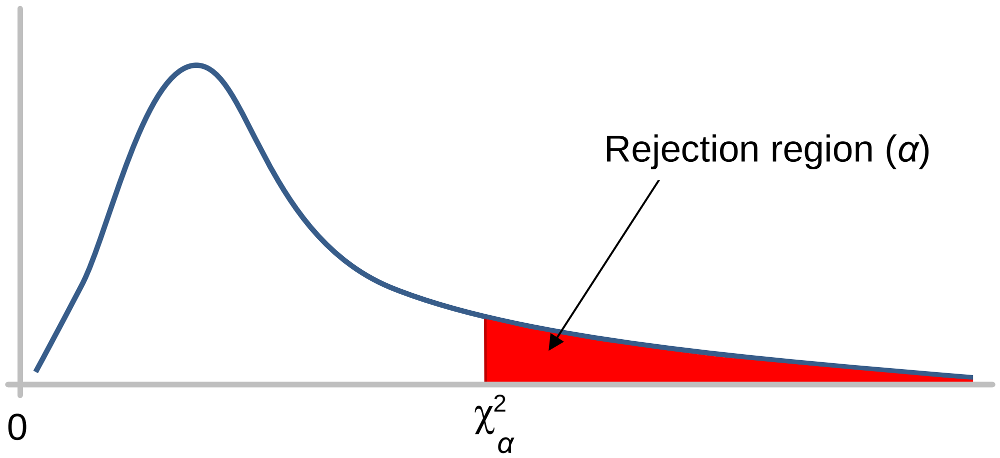


Fig. 5.11. The χ^2 distribution showing the critical value for rejecting the null hypothesis.

[213] Cited from <www.real-statistics.com/one-way-analysis-of-variance-anova/kruskal-wallis-test/>, accessed March 2021. These images and text are reproduced with kind permission of Charles Zaiontz.

In this instance, *degrees of freedom* (df.) for k groups = $k - 1 = 10 - 1 = 9$. Graphically, the region for rejecting H_0 falls in the right-tail of the distribution curve, i.e. the area to the right of the critical value χ^2_α (chi-squared at point α) – we have specified the *level of significance* (α) as 0.01, which equates to a 99% level of confidence. The value of $\chi^2_\alpha = 21.66599$ (from the look-up table). This means that if the test statistic (H), as calculated, has a value higher than 21.66599, the null hypothesis is rejected.

The null hypothesis is further tested by conducting multiple comparisons between all groups (k) with the presumption they equal the Mean Rank (MR):

$H_0 : MR_1 = .. = MR_k$

$H_1 : not(MR_1 = .. = MR_k)$

H_0 is rejected when one or several groups demonstrate a statistically dominant variance over others at the specified level of significance (α). In terms of the GCH, this shows whether hill-terms are distributed randomly relative to the landforms they denote. Moreover, if such associations are non-random, the test also identifies which parameters for which groups are statistically significant (as measured by this prototype) and therefore likely to be systematic.

The test data generated by Ovsienko's software was extracted from `export.csv` and divided between 11 Microsoft Excel tabs, one per parameter (§5.4.1–§5.4.3), with columns for each of the ten superordinate groupings (BRAE, BANK, etc.). This preparation allows for easy and accurate uploading to an online statistics calculator.[214] As stated, an additional test for normality (the Shapiro-Wilk Test) is performed by the calculator. The results (Table 5.7) identify that the test data are not normally distributed and so provide justification for using the main Kruskal-Wallis Test.

[214] 'Statistics Kingdom' <www.statskingdom.com/kruskal-wallis-calculator.html>, accessed March 2021.

5.6 Testing the Gelling-Cole Hypothesis – Berwickshire

In the following sections, the ten hill-term groups (*BANK*, *BRAE*, *HILL*, *KNOLL*, *LAW*, *RIG*, *SIDE*, *CLIF*, *DOUN*, and *HUCH*) are compared in turn with one another for each of the 11 parameters: Length (§5.6.1); Width (§5.6.2); Perimeter (§5.6.3); Mesh Perimeter (§5.6.4); Settlement to Relief-feature Distance (§5.6.5); Relief-feature Altitude (§5.6.6); Relief-feature Topographical Prominence (§5.6.7); Settlement Altitude (§5.6.8); Settlement to Relief-feature Gradient (§5.6.9); Relief-feature Surface Area (§5.6.10); and Relief-feature Mesh Surface Area (§5.6.11).

To reiterate, for the null hypothesis to be rejected in each comparison, the Mean Rank of parameters between groups must be significantly different. Had measured landforms been assigned randomly to groups, then any dominance of one group over others would be the operation of chance. However, the groups in this experiment have been constructed to ensure the only common denominator differentiating one group of landforms from others is the hill-term in their names. If the range of possible landforms, as computed by toponymetry, show groups to be statistically dissimilar, then we can conclude their names have been coined non-randomly and the GCH is the likely cause.

The result tables (§5.6.1–§5.6.12; §6.3.1–§6.3.8; §6.4.1–§6.4.8) summarize six test measurements presented as a grid:

(i) Null hypothesis (H_0):		(iv) Type 1 error risk:	
(ii) *p*-value:		(v) Effect size (η^2):	
(iii) Test statistic (H):		(vi) Test power:	

These test measurements are:

i) Do we a) *reject* or b) *fail to reject* the **Null hypothesis** (H_0) that 'settlement-names were coined randomly from hill-terms'?[215]

- If we *reject* (H_0), we conclude the *alternative hypothesis* (H_1) is proven, i.e. systematic settlement-naming (the GCH) has been verified.
- If we *fail to reject* (H_0), we conclude the *alternative hypothesis* (H_1) is not proven, and the GCH has not been verified, i.e. settlement-names *were* coined randomly from hill-terms.

It is important to emphasise that in hypothesis testing, H_0 cannot be proven to be true – after all, in the quantifiable universe all truth is relative and cannot be established of itself. Instead, these tests conclude that H_0 cannot be rejected in favour of H_1 or vice versa, at a stated level of confidence, which in this case is 99%.

ii) The ***p*-value** expresses the probability of groups being differentiated by the test parameter. It communicates the likelihood of incorrectly rejecting a true null hypothesis (a Type 1 error). Given the abnormality of the data (Table 5.7), effort has been made to minimize the risk of a Type 1 error by reducing α to a minimal value of 0.01. In the test results, the closer the *p*-value approaches 1 the less likely it is H_0 can be rejected. Thus, a very low *p*-value gives confidence H_0 can be safely rejected in favour of H_1, which in this case is a validation of the GCH.

iii) The **Test statistic** (H) confirms the degree of overall difference, i.e. how far the result lies to the right (rejection region) or left (non-rejection region) on the chi-squared distribution (Fig. 5.11).

The software automatically generates three other values:

[215] See §1.5.2 on the use of this terminology.

iv) **Type 1 error risk –** a very low value gives confidence the risk is small.

v) **Effect size** (the eta-squared value – η^2) expresses the magnitude of the overall difference between groups.

vi) **Test power –** the closer the value approaches 1 the stronger is the test.

Beneath this summary on each parameter page, the results of multiple comparisons between groups are shown in two tables. Essentially, each pairing generates a value relative to a critical value, which akin to the main result determines whether the null hypothesis has been rejected or not for that combination of two groups. The **critical value** of the upper table is the value of H (compared with the critical value = 10.83). The lower table gives the ***p*-value** for each pairing. Once again, the smaller this value the more probable it is the observed effect is not random. Results highlighted in **red** are strong confirmation hill-terms are used systematically; **orange** is more marginal confirmation.

It must be restated that the measurements upon which the following statistical conclusions are based are neither perfect nor complete profiles of the relief-features they represent. The sections of measured terrain do not reflect the whole hill but (usually) the area of the summit without the inclusion of foot slopes, shoulders, secondary ridges, and so forth (§5.3.2). Nevertheless, the measurements obtained are consistent in that they are just a liable to misrepresent or abbreviate all hills in an identical way. Therefore, although the metrics could be more comprehensive in characterizing the complete landform, they are usable and directly comparable. It is hoped future stages in the development of toponymetry will improve upon and develop the initial concepts and processes illustrated here.

The results for Berwickshire are as follows:

5.6.1 Length (len.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	**$p < \alpha$, H_0 is rejected**	Type 1 error risk:	7.846×10^{-10} (small)
p-value:	**7.8×10^{-10}**	Effect size (η^2):	0.17 (large)
Test statistic (H):	**61.21** > χ^2 (21.66599)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	*BRAE*	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	5.99	3.31	2.24	2.11	1.00	4.23	1.47	0.10	2.15
BRAE		**25.44**	0.34	**22.43**	**18.15**	**19.50**	1.85	**14.00**	0.76
HILL			**17.31**	0.66	1.28	0.36	5.94	3.75	**12.53**
KNOLL				**15.66**	**11.92**	**10.89**	0.35	3.71	0.34
LAW					0.11	0.93	4.64	2.41	**10.98**
RIG						1.93	3.35	0.43	8.95
SIDE							6.50	6.36	**11.65**
CLIF								2.48	0.72
DOUN									7.02

p-value

	BRAE	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	0.014	0.069	0.13	0.15	0.32	0.04	0.23	0.76	0.14
BRAE		**4.6×10^{-7}**	0.56	**2.2×10^{-6}**	**2×10^{-5}**	**1×10^{-5}**	0.17	**1.8×10^{-4}**	0.38
HILL			**3.2×10^{-5}**	0.42	0.26	0.55	0.015	0.053	**4×10^{-4}**
KNOLL				**7.6×10^{-5}**	**5.5×10^{-4}**	**9.7×10^{-4}**	0.55	0.054	0.56
LAW					0.74	0.34	0.031	0.12	**9.2×10^{-4}**
RIG						0.16	0.067	0.51	**2.8×10^{-3}**
SIDE							0.011	0.012	**6.4×10^{-4}**
CLIF								0.12	0.39
DOUN									0.008

5.6.2 Width (wid.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	2.954×10^{-10} (small)
p-value:	**3×10^{-10}**	Effect size (η^2):	0.18 (large)
Test statistic (H):	**63.40** > χ^2 (21.66599)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	*BRAE*	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	6.26	3.9	1.82	2.69	1.12	2.38	0.72	0.64	3.43
BRAE		**24.20**	2.27	**22.76**	**17.01**	**15.83**	1.55	**15.33**	2.10
HILL			**17.65**	0.94	3.15	0.033	6.18	2.23	**15.09**
KNOLL				**15.95**	10.21	9.39	0.049	5.77	0.24
LAW					0.88	0.34	5.81	1.18	**13.39**
RIG						2.60	3.78	0.16	**11.25**
SIDE							5.97	1.08	**11.19**
CLIF								6.89	0.46
DOUN									**10.98**

p-value

BANK	0.012	0.048	0.18	0.10	0.29	0.12	0.40	0.42	0.064
BRAE		**8.7×10^{-7}**	0.13	**1.8×10^{-6}**	**3.7×10^{-5}**	**6.9×10^{-5}**	0.21	**9×10^{-5}**	0.15
HILL			**2.7×10^{-5}**	0.33	0.076	0.86	0.013	0.14	**1×10^{-4}**
KNOLL				**6.5×10^{-5}**	0.0014	0.0022	0.82	0.016	0.63
LAW					0.35	0.56	0.016	0.28	**2.5×10^{-4}**
RIG						0.11	0.052	0.69	**8×10^{-4}**
SIDE							0.015	0.30	**8.2×10^{-4}**
CLIF								0.0087	0.50
DOUN									**9.2×10^{-4}**

5.6.3 Perimeter (per.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	**$p < \alpha$, H_0 is rejected**	Type 1 error risk:	5.763×10^{-10} (small)
p-value:	**5.763×10^{-10}**	Effect size (η^2):	0.17 (large)
Test statistic (H):	**61.8994** > χ^2 (21.66599)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	*BRAE*	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	5.73	3.55	1.92	2.30	1.08	3.62	0.72	0.64	2.63
BRAE		**24.47**	0.75	**22.62**	**17.17**	**18.24**	1.85	**15.33**	0.89
HILL			**17.65**	0.75	1.63	0.16	6.02	3.21	**13.61**
KNOLL				**16.40**	**11.34**	10.23	0.27	4.85	0.29
LAW					0.25	0.62	4.56	2.48	**12.34**
RIG						2.04	3.21	0.03	9.58
SIDE							7.62	4.34	**12.12**
CLIF								6.22	0.26
DOUN									7.47

p-value

	BRAE	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	0.0167	0.05962	0.1661	0.1293	0.2987	0.05703	0.396	0.423	0.1051
BRAE		**7.56×10^{-7}**	0.3853	**1.97×10^{-6}**	**3.42×10^{-5}**	**3.42×10^{-5}**	0.1742	**9×10^{-5}**	0.3463
HILL			**2.66×10^{-5}**	0.387	0.2016	0.6873	0.01414	0.07314	**2.25×10^{-4}**
KNOLL				**5.14×10^{-5}**	**7.59×10^{-4}**	**1.38×10^{-3}**	0.6038	0.02758	0.5914
LAW					0.6206	0.4309	0.03278	0.1151	**4.43×10^{-4}**
RIG						0.1534	0.07315	0.872	**1.97×10^{-3}**
SIDE							0.005759	0.03728	**4.98×10^{-4}**
CLIF								0.01263	0.6098
DOUN									0.006271

5.6.4 Mesh Perimeter (mesh per.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	**$p < \alpha$, H_0 is rejected**	Type 1 error risk:	6.519×10^{-10} (small)
p-value:	**6.5×10^{-10}**	Effect size (η^2):	0.17 (large)
Test statistic (H):	**61.62** > χ^2 (21.66599)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	*BRAE*	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	5.47	3.48	2.24	2.33	1.04	3.62	0.72	0.64	2.63
BRAE		**24.29**	0.53	**22.33**	**17.01**	**18.24**	1.85	**14.88**	0.64
HILL			**17.65**	0.76	1.68	0.17	6.1	3.25	**13.61**
KNOLL				**16.21**	**11.34**	10.23	0.27	4.85	0.29
LAW					0.25	0.64	4.56	2.48	**12.34**
RIG						2.04	3.08	0.026	9.58
SIDE							7.62	4.34	**12.12**
CLIF								6.22	0.46
DOUN									7.47

p-value

	BRAE	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	0.019	0.062	0.13	0.13	0.31	0.057	0.4	0.42	0.11
BRAE		**8.3×10^{-7}**	0.47	**2.3×10^{-6}**	**3.7×10^{-5}**	**2×10^{-5}**	0.17	**1.1×10^{-4}**	0.43
HILL			**2.7×10^{-5}**	0.38	0.2	0.68	0.013	0.072	**2.3×10^{-4}**
KNOLL				**5.7×10^{-5}**	**7.6×10^{-4}**	**1.4×10^{-3}**	0.6	0.028	0.59
LAW					0.62	0.43	0.033	0.12	**4.4×10^{-4}**
RIG						0.15	0.079	0.87	0.002
SIDE							0.0058	0.037	**5×10^{-4}**
CLIF								0.013	0.5
DOUN									0.0063

5.6.5 Settlement to Relief-feature Distance (•S•to•R• dis.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	*p*-value > α, H_0 unrejected	Type 1 error risk:	0.93 (high)
p-value:	0.068	Effect size (η^2):	0.041 (medium)
Test statistic (H):	15.95 < χ^2 (21.66599)	Test power:	0.9945 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	BRAE	HILL	KNOLL	LAW	RIG	SIDE	CLIF	DOUN	HUCH
BANK	0.036	4.15	1.37	3.33	1.46	2.26	2.29	1.91	0.14
BRAE		2.8	0.86	1.92	0.68	0.46	1.33	0.97	0.083
HILL			4.11	0.61	0.75	0.63	5.78	0.33	0.76
KNOLL				3.1	3.1	2.45	0.21	2.44	1.93
LAW					0.067	0.16	5.12	0.077	0.44
RIG						0.0018	3.6	0.094	0.2
SIDE							3.49	0	0.26
CLIF								2.96	1.71
DOUN									0.54

p-value

	BRAE	HILL	KNOLL	LAW	RIG	SIDE	CLIF	DOUN	HUCH
BANK	0.85	0.042	0.24	0.068	0.23	0.13	0.13	0.17	0.71
BRAE		0.094	0.35	0.17	0.41	0.5	0.25	0.33	0.77
HILL			0.043	0.43	0.39	0.43	0.016	0.56	0.38
KNOLL				0.078	0.079	0.12	0.64	0.12	0.16
LAW					0.8	0.68	0.024	0.78	0.51
RIG						0.97	0.058	0.76	0.66
SIDE							0.062	1.0	0.61
CLIF								0.085	0.19
DOUN									0.46

5.6.6 Relief-feature Altitude (•R• alt.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	2.073×10^{-5} (small)
p-value:	**5.1×10^{-5}**	Effect size (η^2):	0.086 (medium)
Test statistic (H):	**35.40** > χ^2 (21.66599)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	*BRAE*	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	0.96	6.97	0.4	5.7	3.83	3.43	0.37	1.52	0.006
BRAE		**21.59**	6.24	**17.71**	**11.21**	**13.96**	3.71	**12.32**	1.89
HILL			3.93	0.024	0.92	0.0065	1.39	0.49	8.12
KNOLL				3.63	0.42	3.31	0.022	1.47	0.95
LAW					1.27	0.05	0.66	0.44	5.02
RIG						0.52	0.28	0.042	2.62
SIDE							1.13	0.51	7.46
CLIF								0.84	1.04
DOUN									3.95

p-value

	BRAE	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	0.33	0.0083	0.52	0.017	0.05	0.064	0.54	0.22	0.94
BRAE		**3.4×10^{-6}**	0.012	**2.6×10^{-5}**	**8.1×10^{-4}**	**1.9×10^{-4}**	0.054	**4.5×10^{-4}**	0.17
HILL			0.047	0.88	0.34	0.94	0.24	0.49	0.0044
KNOLL				0.057	0.52	0.069	0.88	0.23	0.33
LAW					0.26	0.82	0.42	0.51	0.025
RIG						0.47	0.59	0.84	0.11
SIDE							0.29	0.48	0.0063
CLIF								0.36	0.31
DOUN									0.047

5.6.7 Relief-feature Topographical Prominence (pro.)

α = 0.01 (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	**$p < \alpha$, H_0 is rejected**	Type 1 error risk:	6.268×10^{-5} (small)
p-value:	**6.3×10^{-5}**	Effect size (η^2):	0.12 (large)
Test statistic (H):	**34.88** $> \chi^2$ (21.66599)	Test power:	0.9994 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	*BRAE*	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	0.5	0.45	1.19	0.018	1.08	0.045	0.86	0.017	1.76
BRAE		0.8	0	0.57	0.26	0.25	1.5	1.74	2.36
HILL			8.45	2.4	**20.29**	6×10^{-5}	3.78	1.17	6.68
KNOLL				4.18	0.57	2.54	0.53	5.2	0.58
LAW					**11.52**	0.17	2.51	0.011	4.41
RIG						5.6	0.13	9.97	1.07
SIDE							4	0.01	7.39
CLIF								4.79	4.24
DOUN									10.41

p-value

	BRAE	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	0.48	0.5	0.28	0.89	0.3	0.83	0.35	0.9	0.18
BRAE		0.37	1	0.45	0.61	0.62	0.22	0.19	0.12
HILL			0.0037	0.12	**6.7×10^{-6}**	0.99	0.052	0.28	0.0097
KNOLL				0.041	0.45	0.11	0.47	0.023	0.45
LAW					**6.7×10^{-4}**	0.68	0.11	0.92	0.036
RIG						0.018	0.72	**0.0016**	0.3
SIDE							0.046	0.92	0.0066
CLIF								0.029	0.04
DOUN									**0.0013**

5.6.8 Settlement Altitude (•S• alt.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	*p*-value > α, H_0 unrejected	Type 1 error risk:	0.1263 (high)
p-value:	0.13	Effect size (η^2):	0.027 (small)
Test statistic (H):	$13.89 < \chi^2$ (21.66599)	Test power:	0.9991 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	BRAE	HILL	KNOLL	LAW	RIG	SIDE	CLIF	DOUN	HUCH
BANK	2.29	0.36	2.14	0.34	0.19	0.81	0	1.49	0.18
BRAE		4.27	0.21	3.63	0.84	5.36	3	5.43	0.41
HILL			2.92	0.014	2.74	0.51	0.0084	1.43	1.23
KNOLL				3.24	0.39	4.5	3.43	4.6	1.01
LAW					3.04	0.67	0.00098	1.46	0.86
RIG						2.4	0.63	2.89	0.037
SIDE							0.38	0.33	2.35
CLIF								0.22	0.73
DOUN									2.37

p-value

	BRAE	HILL	KNOLL	LAW	RIG	SIDE	CLIF	DOUN	HUCH
BANK	0.13	0.55	0.14	0.56	0.66	0.37	1	0.22	0.67
BRAE		0.039	0.64	0.057	0.36	0.021	0.083	0.02	0.52
HILL			0.087	0.91	0.098	0.48	0.93	0.23	0.27
KNOLL				0.072	0.53	0.034	0.064	0.032	0.31
LAW					0.081	0.41	0.98	0.23	0.35
RIG						0.12	0.43	0.089	0.85
SIDE							0.54	0.56	0.13
CLIF								0.64	0.39
DOUN									0.12

5.6.9 Settlement to Relief-feature Gradient (•S•to•R• gra.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	0.008174 (small)
p-value:	**0.0082**	Effect size (η^2):	0.078 (medium)
Test statistic (H):	**22.23** > χ^2 (21.66599)	Test power:	0.9945 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	***BRAE***	***HILL***	***KNOLL***	***LAW***	***RIG***	***SIDE***	***CLIF***	***DOUN***	***HUCH***
BANK	1.29	0.27	2.14	0.34	0.64	0.33	0.89	0.027	1.75
BRAE		6.13	0.21	5.66	4.9	1.85	1.33	3.87	0
HILL			4.11	1.18	4.57	0.74	1.74	0.62	6.61
KNOLL				4.59	4.54	1.7	0.86	3.82	0.21
LAW					0.96	0.11	0.55	1.27	6.06
RIG						0.044	0.064	4.13	5.04
SIDE							0.26	1.38	1.85
CLIF								2.96	1.33
DOUN									4.9

p-value

	BRAE	***HILL***	***KNOLL***	***LAW***	***RIG***	***SIDE***	***CLIF***	***DOUN***	***HUCH***
BANK	0.26	0.61	0.14	0.56	0.42	0.56	0.34	0.87	0.19
BRAE		0.013	0.64	0.017	0.027	0.17	0.25	0.049	1
HILL			0.043	0.28	0.033	0.39	0.19	0.43	0.01
KNOLL				0.032	0.033	0.19	0.35	0.051	0.64
LAW					0.33	0.74	0.46	0.26	0.014
RIG						0.83	0.8	0.042	0.025
SIDE							0.61	0.24	0.17
CLIF								0.085	0.25
DOUN									0.027

5.6.10 Relief-feature Surface Area (sur.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	3.932×10^{-10} (small)
p-value:	**3.9×10^{-10}**	Effect size (η^2):	0.18 (large)
Test statistic (H):	**62.76** > χ^2 (21.66599)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	*BRAE*	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	5.47	4.71	1.43	3.37	1.04	2.38	0.72	0.85	2.38
BRAE		**24.55**	1.49	23.50	**16.69**	**17.42**	1.55	**15.33**	1.52
HILL			**17.37**	0.81	3.5	0.003	5.86	2.49	**14.30**
KNOLL				**15.11**	10.12	8.98	0.14	4.68	0.19
LAW					1.17	0.046	4.81	1.77	**13.29**
RIG						1.73	2.81	0.033	9.58
SIDE							7.05	1.08	**13.09**
CLIF								6.22	0.12
DOUN									**10.98**

p-value

	BRAE	*HILL*	*KNOLL*	*LAW*	*RIG*	*SIDE*	*CLIF*	*DOUN*	*HUCH*
BANK	0.019	0.03	0.23	0.066	0.31	0.12	0.4	0.36	0.12
BRAE		**7.2×10^{-7}**	0.22	**1.3×10^{-6}**	**4.4×10^{-5}**	**3×10^{-5}**	0.21	**9×10^{-5}**	0.22
HILL			**3.1×10^{-5}**	0.37	0.061	0.96	0.015	0.11	**1.6×10^{-4}**
KNOLL				**1×10^{-4}**	**0.0015**	0.0027	0.71	0.031	0.66
LAW					0.28	0.83	0.028	0.18	**2.7×10^{-4}**
RIG						0.19	0.093	0.86	0.002
SIDE							0.0079	0.3	**3×10^{-4}**
CLIF								0.013	0.73
DOUN									**9.2×10^{-4}**

5.6.11 Relief-feature Mesh Surface Area (mesh sur.)

***α* = 0.01** (Level of Confidence = 99%; df. = 9)

Null hypothesis (H_0):	**$p < \alpha$, H_0 is rejected**	Type 1 error risk:	4.001×10^{-10} (small)
p-value:	**4×10^{-10}**	Effect size (η^2):	0.18 (large)
Test statistic (H):	**62.72** > χ^2 (21.66599)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.83

H stat.	BRAE	HILL	KNOLL	LAW	RIG	SIDE	CLIF	DOUN	HUCH
BANK	5.47	4.71	1.43	3.33	1.04	2.54	0.72	0.85	2.38
BRAE		**24.47**	1.33	**23.2**	**16.53**	**17.42**	1.55	**14.88**	1.52
HILL			**17.37**	0.87	3.61	0.0052	5.86	2.62	**14.47**
KNOLL				15	9.94	8.98	0.088	5.03	0.19
LAW					1.23	0.05	4.81	1.74	**13.29**
RIG						1.78	2.81	0.033	9.58
SIDE							7.05	1.08	**13.09**
CLIF								6.22	0.12
DOUN									**10.98**

p-value

	BRAE	HILL	KNOLL	LAW	RIG	SIDE	CLIF	DOUN	HUCH
BANK	0.019	0.03	0.23	0.068	0.31	0.11	0.40	0.36	0.12
BRAE		**7.6×10^{-7}**	0.25	**1.5×10^{-6}**	**4.8×10^{-5}**	**3×10^{-5}**	0.21	**1.1×10^{-4}**	0.22
HILL			**3.1×10^{-5}**	0.35	0.057	0.94	0.015	0.11	**1.4×10^{-4}**
KNOLL				**1.1×10^{-4}**	**0.0016**	0.0027	0.77	0.025	0.66
LAW					0.27	0.82	0.028	0.19	**2.7×10^{-4}**
RIG						0.18	0.093	0.86	0.002
SIDE							0.0079	0.30	**3×10^{-4}**
CLIF								0.013	0.73
DOUN									**9.2×10^{-4}**

5.6.12 Results Summary and Observations

	Parameter	Prevailing hypothesis
§5.6.1	Relief-feature Length (len.)	**GCH** (H_1)
§5.6.2	Relief-feature Width (wid.)	**GCH** (H_1)
§5.6.3	Relief-feature Perimeter (per.)	**GCH** (H_1)
§5.6.4	Relief-feature Mesh Perimeter (mesh per.)	**GCH** (H_1)
§5.6.5	Settlement to Relief-feature Distance (•S•to•R• dis.)	*random* (H_0)
§5.6.6	Relief-feature Altitude (•R• alt.)	**GCH** (H_1)
§5.6.7	Relief-feature Topographical Prominence (pro.)	**GCH** (H_1)
§5.6.8	Settlement Altitude (•S• alt.)	*random* (H_0)
§5.6.9	Settlement to Relief-feature Gradient (•S•to•R• gra.)	*?random* (H_1)
§5.6.10	Relief-feature Surface Area (sur.)	**GCH** (H_1)
§5.6.11	Relief-feature Mesh Surface Area (mesh sur.)	**GCH** (H_1)

Table 5.8. Results summary of Berwickshire hill-term heterogeneity.

Three test parameters (•S•to•R• dis., •S• alt., and •S•to•R• gra.) were included with an open mind to see if they might prove to be non-random. These focus upon attributes of the settlement rather than the terrain. Given the nature of the software, computing these values is comparatively straightforward to implement, and as it transpires they have proven to be a useful control against which to compare the parameters that specifically describe the relief-feature. The results show that the variables of distance from the settlement, the altitude of the settlement, and the gradient between settlement and relief-feature are indeed quite random – as one might predict. It is true the results for Settlement to Relief-feature Gradient (§5.6.9) do marginally reject the null hypothesis, yet given the broader results for paired comparisons, the finding is too weak to conclude this particular parameter is statistically significant. In all probability, the values obtained for •S•to•R• gra. are not evidence of systematic distribution.

The significance of this finding regarding •S•to•R• dis., •S• alt., and •S•to•R• gra. is that an identical test of all 11 parameters positively identified only these three as random; the other eight variables, measuring the relief-feature, were computed to be statistically significant.

5.7 Conclusion

This chapter has demonstrated the possibility of generating unsupervised measurements of relief-features by specifying a single co-ordinate and analysing the results using a standard model for hypothesis testing. The first of two tests piloted toponymetry, drawing attention to potential issues with this approach and how in some instances these can be avoided. Nonetheless, 73% of the Berwickshire hills characterized could be used to generate representative metrics. A second test introduced a method of statistical analysis by which to compare values between relief-features. It successfully eliminated three parameters that were likely to be random and confirmed that only those relating directly to hill-shape are significant. Cross-testing between groups of closely related hill-terms has been demonstrated to be non-random. The weight of evidence in favour of systematic place-naming would appear to tip towards the GCH operating in the study area. Table 5.8 shows that *BANK*, *BRAE*, *HILL*, *KNOLL*, *LAW*, *RIG*, *SIDE*, *CLIF*, *DOUN*, and *HUCH* are not synonyms.

The extent to which these initial results for Berwickshire parallel those for comparable English place-names more generally will be considered in the next chapter. Conclusions from both chapters will be discussed in depth in Chapter 7.

A LANDSCAPE OF HILL-NAMES

Chapter 6

6.0 Summary

This chapter charts the compilation and interrogation of two place-name corpora referencing hills, slopes, and ridges cited as evidence for the GCH by its authors. As previously applied to Berwickshire place-names (§5.5–§5.7), an initial dataset of all locatable *LPN* examples will be profiled using geomorphometry. Analysis of the resulting metrics will determine whether landforms, grouped only by the generic elements of the names attributed to them, can be differentiated using measurements of 'the existing landscape' (*LPN*, xiv).

The questions of whether the naming system Gelling and Cole decoded (*LPN*, xvi) extends into Scotland and if all hill-terms are involved (§1.3.1; §1.3.2) will be addressed by comparison of Berwickshire results with material extracted from *LPN* and supplemented by details gleaned from *PNL* and Gelling 1978. This will entail a statistical comparison between landforms of predominantly English provenance and Scottish relief-features named with equivalent hill-terms. Homogeneity with the *LPN* 'canon' will be taken as evidence for the GCH having operated in Berwickshire.

6.1 A *Landscape of Place-Names* Corpus

Most of the preparatory stages used in compiling the Berwickshire datasets (Chapter 4) are unnecessary when examining Gelling and Cole's own examples. The reliability of the toponymic triage values for *etymology*, *terrain*, and *sources* are taken as established and well-founded. The element sections of *LPN* Chapter 5, supported by passages in *PNL*, provide detailed lists from which to mine copious instances for each hill-term.[216]

6.1.1 Overview

'Hills, Slopes and Ridges' (*LPN*, 143–219) cites 1,541 toponyms to demonstrate the operation of systematic naming involving 47 hill-terms (Table 2.1). This represents 25% of the total *LPN* corpus of 6,302 GCH examples. Allowing for the greater time-depth of English toponymic sources and therefore the labels ascribed to language stages, the Berwickshire corpora (BWK1 and BWK2) share 16 hill-term elements with *LPN*.

Table 5.5 shows that 1,175 (76%) of the toponyms in *LPN* (Chapter 5) can be analysed and compared with Scottish equivalents. Of this total, 22 names have more than one target element (§4.2.1.1), and two relate to a small group of hills named as a collective (§4.2.1.2). As with the Berwickshire datasets, additional spreadsheet rows are required to test separately for each element and locus. Thus, an initial compilation of *LPN* data comprises 1,194 spreadsheet rows (i.e. separate tests) of 1,175 head-names (Table 6.1).

The resulting corpora are arranged slightly differently from those created for Berwickshire. LPN1 (*Appendix L*) contains: topographical settlement-name; historical county; co-appellative code; relief-feature location; hill classification (§6.1.3); and descriptors of measurability (including factors such as human modification) and relief-feature locatability. LPN2 (*Appendix M*) is the remnant of *LPN* examples that cannot be located or have been destroyed, as well as place-names with non-hill-term senses (e.g. pertaining to tumuli). Both are arranged alphabetically by element, and then by place-name. LPN3 is an index to LPN1 and the *LPN* section of the *Atlas* (Vol. III), arranged alphabetically by settlement-name.

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[216] *Appendix O* (Vol. II) gives a complete list of correspondences for all GCH elements between the two works.

	Element	Head-names	Rows (tests)
1	Brit *blakno-*	7	7
2	Brit *breȝ, brig*	14	15
3	Brit *brinn, bryn*	5	5
4	OE *camb*	4	10
5	OE *clif*	140	140
6	OE *cnoll*	23	23
7	OE *dūn*	358	362
8	OE *ecg*	15	15
9	OE *hēafod*	60	63
10	OE *hlāw*	66	66
11	OE *hōh*	155	156
12	OE *hrycg*	72	72
13	OE *hyll*	180	183
14	OE *næss, ness*	43	44
15	OE *pēac, pīc*	16	16
16	OE *sīde*	17	17
		1,175	**1,194**

Table 6.1. *LPN* elements shared with Berwickshire.

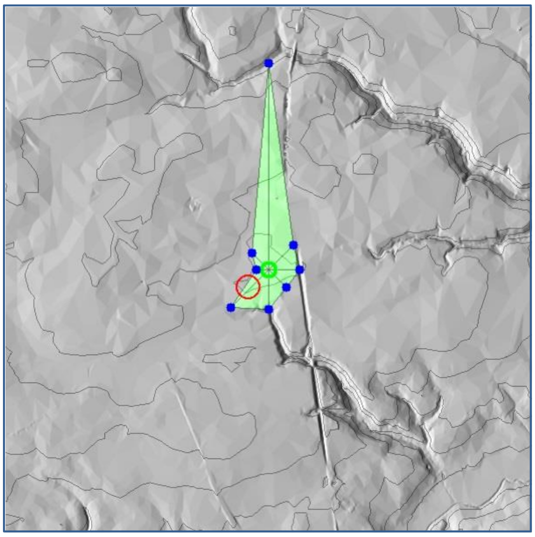
The conventions established for the Berwickshire datasets are replicated. Language subscript prefixes and superscript senses refer to *Language and Dialect Abbreviations* (p. xvi) and Table 4.7. Settlement-names are given as they appear in *LPN*, but these are augmented by affixes in square brackets to aid location on current OS maps. Parishes, where supplied by *LPN*, appear in parenthesis. Obsolete forms and names are italicized and occasionally supplemented with earlier or later place-names (indicated by '<' and '>'). A subscript curly brace suffixed to a name shows that multiple potential hill-terms are present and will be analysed separately through the creation of additional rows. County names with a trailing asterisk reflect their restoration from 'GTL' and 'IOW' used by *LPN*. Inferred NGRs are prefixed by an asterisk, and approximate locations that cannot be measured are indicated by asterisked 1 km square co-ordinates. Relief-feature names, where available, are those that appear for the given location on current OS maps but do not necessarily indicate a particular association with the settlement-name under examination. These are shown in the *Atlas*.

6.1.2 Identification and Typology of Relief-features

In the discussion of selected toponyms and in its index and reference sections, *LPN* provides every settlement-name with a county abbreviation. Where further information is necessary to achieve identification, a parish, locality, or some other association is added. However, this apparently straightforward arrangement conceals several obstacles for researchers who attempt to locate every settlement mentioned and then proceed to identify which of the surrounding relief-features is intended to be the eponymous one – most hills are not separately named, or if they once were, their names have not survived. This section will explore the issues that arise in attempting to pinpoint the actual hills cited in *LPN* Chapter 5 and outline the solutions that have been applied in creating a 'canonical' corpus.

Many of *LPN*'s examples and the counties to which these are ascribed are based on *DEPN*, the core of which was composed before 1936. Since then, place-name orthography and county boundaries have not remained static; YOE, YON, and YOW present a particular challenge in this regard. Locating all of Gelling and Cole's exemplar relief-features from modern maps (and the digital indexes of these) is constrained by several complications: spelling variation; the regular omission of secondary specifics, affixes and epexegetics (e.g. only 15/17 examples of 'Houghton YON' have been traced); the use of GTL and IOW as counties in place of their historical attributions; and the inevitable typos in a work of such magnitude and detail. Identifying a cited toponym frequently requires a good deal of extra research, which is not always conclusive. Cross-referencing *LPN*'s examples with its main source, *DEPN*, can help to identify which place-name is intended when several identical candidates appear in the same county, and *DEPN* and *LPN* usually agree as to the county when boundaries have fluctuated during the twentieth century.[217]

[217] I am grateful to Ann Cole for her suggestion that precise identification of frequently repeated identical names in the reference sections of *PNL* and *LPN* can be made with confidence by using the examples cited by *DEPN* (personal communication, March 2018).



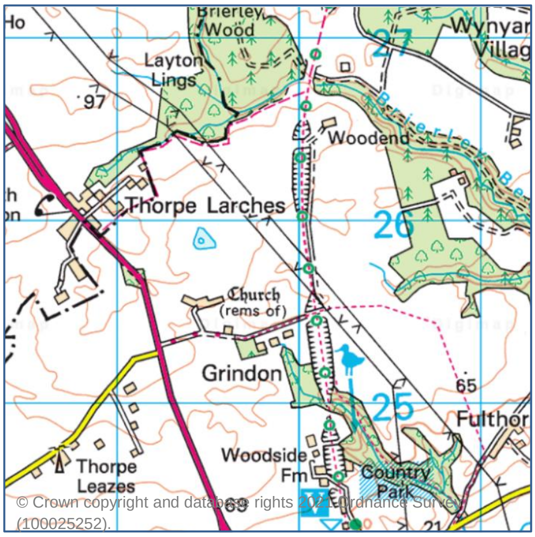


Fig. 6.1. The OE *dūn* of Grindon DRH.

Another difficulty, though not of *LPN*'s making, is that large swathes of the natural terrain of England have been irrevocably altered, if not obliterated, by the construction of transport infrastructure, reservoirs, industrialization and its aftermath, and unfettered urbanization. Around 47% of the hills cited in *LPN* (pp. 143–219) as evidence for the GCH are affected to varying degrees. If unsupervised GIS terrain modelling and analysis is applied to the modern landscape, the disturbed contours of quarries, slag-heaps, embankments, and motorway landscaping are inevitably misinterpreted as natural features and false values returned. Fig. 6.1 (left) illustrates the curtailed polygon of Grindon DRH, where the eastern and north-eastern computations are disrupted by an obsolete railway cutting as depicted in the corresponding OS map (right). Even human interpretation of the landscape from map-contours can be problematic as former dark satanic mills and collieries have been demolished and disguised beneath the green and pleasant landscape of naturalistic country parks. *LPN* allows for this circumstance, but the tragic scale is a revelation: 'the contours are still there' (*LPN*, xiv) is no longer completely true for almost half of Gelling and Cole's examples of hills, slopes and ridges.

An *LPN* corpus was created by scanning the index (pp. 324–391; 6,062 head-names) using optical character recognition (OCR) software and then editing manually. Statistics about

LPN are calculated based on from this initial dataset. Toponyms with one or more hill-terms, referenced in 'Hills, Slopes and Ridges' (*LPN*, 143–210), were collated into a Microsoft Excel spreadsheet and augmented by additional rows for every example ascribed to 'var.cos.', which are often detailed in the body of the book under the individual reference sections. Thirteen names were found to evidence two hill-terms and so additional rows were created in the manner applied earlier to Berwickshire data (§4.2.1.1). This exercise produced a core of 1,185 dataset rows for 1,172 head-names, grouped under 47 elements and ascribed to the language labels: Old English (29), Old Norse (10), and Celtic (8) – Table 2.2.

Next, settlements (usually the parish church or some other prominent early building) and named hills without co-appellatives were located on modern and historical maps using EDINA's *Digimap* service. A ten-digit NGR was extracted for both settlement and hill. The historical county and orthography of the name were checked and updated (as indicated by square brackets in LPN1 and LPN2). Unlocatable settlements and names for which single hills or hill-spurs could not be identified (e.g. district names; some hundred meeting sites; and instances where several suitable hills could have been the inspiration for the name) were flagged for exclusion, along with transferred names, derivatives, and elements with non-hill-term senses (e.g. tumuli).

The presence of terrain modifying factors (e.g. quarries, etc.) was noted and assigned a degree of severity in order to allow for 'pristine' examples to be compared and analysed separately from those negatively impacted by human activity. Relief-features falling within grey-blocked areas on 1:100,000 scale OS maps were flagged as 'urban' to differentiate terrain likely to be less representative than cultivated and natural hills. The ascription of these impact labels reflects the potential reliability of computed parameters to reflect how the terrain may have presented before the Industrial Revolution. In practice, a four-degree scale is used: 'pristine'; 'impacted – low'; 'impacted – high'; and 'destroyed'. These labels segment the datasets so that analysis can, if necessary, be weighted towards the best-preserved examples. Of course, the oldest occupied sites with the most advantageous local conditions are also those most likely to have become towns and suburbs. Hills in areas producing minerals are similarly over-represented by examples falling towards the erased end of the spectrum. Subtle biases that sorting the *LPN* data in this manner might introduce can only be noted and borne in mind but not eliminated.

The same system might have been applied to the Berwickshire data, but given the largely rural nature of the county and the low number of toponyms involved this would have produced a negligible improvement relative to the effort required to profile all examples. Instead, the handful of negatively impacted toponyms were set aside once the adapted geomorphon software had registered their lack of measurability. Study areas with a greater concentration of industrialization would probably benefit from using the four-degree classification scale.

As topographical elements often evidence a range of connotations, not all of which describe types of measurable landscape (§4.2.2), the discussions of *LPN* and other sources (e.g. *CDEPN*) were combed for clues to aid the location of relief-features. For example, the *terminal* senses of $_{\text{OE}}$ *hēafod*, which locate a settlement at the end of something (Table 4.7, *hēafod*[3, 4, 5, 6]), are obviously inadmissible in this context. Similarly, the wide range of sites in $_{\text{OE}}$ *dūn* (co-located vs. immediately adjacent vs. within view – *LPN*, 164–173) shows a diversity that needs to be differentiated and flagged in order to compare like-for-like.

Following the example of *LPN*, this initial research will treat each hill-term as one group while noting such variation exists. But to facilitate possible future segmentation of the data by a typology of location, a simple yet practical means of hill-shape categorization is implemented in parallel with the identification of relief-features.[218] This attributes classification labels whilst also eliminating examples that do not refer primarily to observable hill-shape. This system is described in the next section. Unidentifiable and destroyed relief-features given in Table 6.1 reduced the tally of testable elements. These are shown in Table 6.2.

	Element	Head-names	Rows (tests)
1	Brit *blakno-*	0	0
2	Brit *breȝ, brig*	-2	-2
3	Brit *brinn, bryn*	-1	-1
4	OE *camb*	-1	-1
5	OE *clif*	-22	-22
6	OE *cnoll*	-1	-1
7	OE *dūn*	-37	-39
8	OE *ecg*	-4	-4
9	OE *hēafod*	-12	-12
10	OE *hlāw*	-46	-46
11	OE *hōh*	-10	-10
12	OE *hrycg*	-3	-3
13	OE *hyll*	-18	-18
14	OE *næss, ness*	-12	-13
15	OE *pēac, pīc*	-4	-4
16	OE *sīde*	-7	-7
		-180	**-183**

Table 6.2. Reduction in the tally of testable *LPN* elements resulting from destroyed or unlocatable relief-features.

6.1.3 Hill Classification

Once identified or inferred from the settlement-site, hills are labelled as:

i) one of four shapes; in

ii) one of six locations; and optionally with

[218] All the datasets in this thesis have been constructed to facilitate follow-up examinations in possible post-doctoral projects (Chapter 8). This means that some segmentation has been implemented without being an actual necessity for the current research, although for the present this can offer useful additional descriptions of the data whilst recording its context during compilation.

iii) one of two descriptors.[219]

This provides 72 permutations that readily convey the horizontal profile of relief-features (as opposed to the aerial view of maps). This classification uses 12 conventional terms with established senses but having a restricted reference in this context. A label for each toponym in the *LPN* corpus is given in *Appendices L* and *M*.

Although elevation is the primary characteristic of hills, some *LPN* examples are in fact very low features in almost level landscapes. The elements $_{\mathrm{OE}}$ *næss, ness* and $_{\mathrm{OE}}$ *hēafod*, for example, include examples of such 'hills' whilst elsewhere the same elements can designate quite elevated features. A simple metric, topographical prominence (pro.), is used to differentiate *flat* from *elevated* features. Drummond 2007b also uses this general concept, which he refers to in that study as 'drop to col' (§3.1.2). Here, this measure is calculated as the difference between the highest point of a relief-feature (summit) and the highest non-encircling 5 m contour. *Flat* hill-classes are hills and hill-spurs with pro. < 20 m. Conversely, *elevated* hill-classes have pro. ≥ 20 m. Occasionally, a small area of encircling contours, which could strictly be designated as a *bank* or *platform* (see below), is found atop another feature, say *headland* or *spit* – this is very frequently encountered with features named with $_{\mathrm{OE}}$ *hōh*. In such instances, the general character of the surrounding topography is used to determine whether these are salient objects in their own right. Usually, minor elevations of this kind are most readily perceived as integral to the larger feature upon which they stand and thus they are disregarded in determining the hill-class.

A close examination of the range of shapes within the examples cited for the 16 hill-terms shared by *LPN* and Berwickshire (Table 6.1) reveals three fundamental shapes:

---

[219] In the absence of a locatable relief-feature to classify (i.e. $^{u}R^{u}$<>•S•), a general characterization of the settlement-site is substituted for general information purposes.

- *compact* = length < 2x breadth;
- *elongated* = length > 2x breadth; and
- *projecting* = a lateral extension from one landform into another.

Building upon the concept of topographical prominence, compact and elongated are considered to be 'independent' hill classes. Essentially, such hills can be imagined as readily separable from the surrounding landscape if the lowest encircling contour is taken as the hill's edge. By an alternative illustration, these hills would become islands if the sea level were to progressively rise; the point of separation (i.e. independence) from the adjacent 'mainland' being equal to the lower point from which topographic prominence is measured. Fig. 6.2. illustrates this very situation. The former ridge of the OE *dūn*-top settlement of Upper Hambleton RUT would become independent of the 'mainland' if the depth of Rutland Water (a modern artificial lake) were caused to rise another few metres.

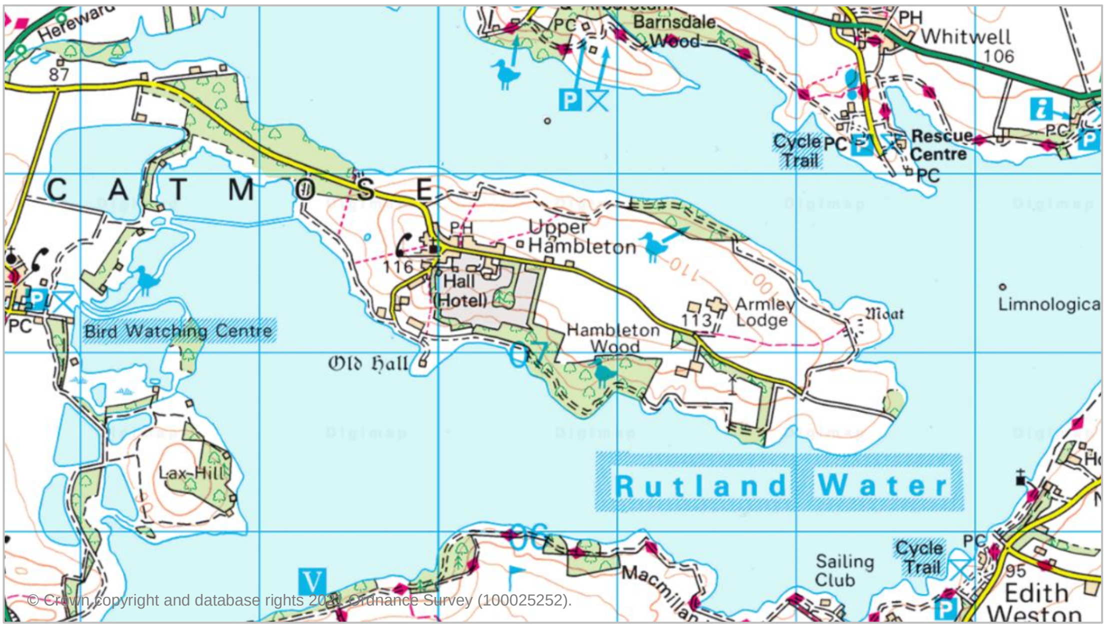


Fig. 6.2. Upper Hambleton RUT; once a *steep inland ridge* now virtually an island.

From such a view of terrain elevations, it follows that in the absence of encircling waters or marshes, current islands would appear as the summits of hills rising from the dry floor of the sea or the beds of lakes and rivers. Therefore, a fourth minor independent hill-class is:

- *insular* = compact or elongated hills surrounded by water.

Projecting designates hill-spurs that are horizontally dependent upon, or subsidiary to, another hill or land-mass. In practice, hills that defy classification as *independent* are *projecting*. In the inundation scenario just described, hills in these classes always remain attached to the 'mainland' to some degree and would never become *insular*.

Easily memorable labels (Table 6.3, in bold) allow the four flat hill-classes to be distinguished from their elevated counterparts:

Hill-class	***Flat*** *(pro. < 20 m)*	***Elevated*** *(pro. > 20 m)*
independent compact hills (length < 2x breadth)[220]	**platform**	**dome**
independent elongated hills (length > 2x breadth)	**bank**	**ridge**
dependent projecting hills (jut laterally from/into another landform)	**spit**	**headland**
independent insular 'hills' (encircled by water / marsh)	**holm**	**island**

Table 6.3. Hill classification labels.

The hills of these four classes could of course be further sub-divided into named areas and parts of hills, which sometimes through synecdoche become generalized to name the entire landform of which they are a part. This process appears to underlie many of the names in OE *ecg*, OE *pēac / pīc*, and OE *sīde*, where a salient portion has been generalized to connote the whole.

Having labelled the parameter of shape, the other classification, location, will be considered.

[220] The extremities of such hills can be circumscribed more easily as a circle than an oval, regardless of any eroded areas that convey water away from the summit. Thus, a hill appearing star-shaped from above is considered to be a *platform* or a *dome*. The perspective from below is that such hills occupy a shorter part of the horizon in comparison to *banks* and *ridges*.

The authors' supposed origins of the GCH (*LPN*, xv) presume the coining and establishment of place-names was a democratic- as opposed to a bureaucratic process, where sufficient frequency of interaction over time led shared perceptions of the surrounding environment to become encoded as meaningful and appropriate names. If the process developed in this fashion, then it is likely hill-elements are describing an elevated horizon viewed either from the most frequent node of interaction – the settlement itself – or from a local routeway linking settlements or areas of activity, as Cole (1994, 2011) proposes. In both circumstances, a relationship to water will be significant.

Characterising hills by their adjacency to water is simple to achieve and appears to mirror the instinctive segmentation of the landscape used by the coiners of place-names. *LPN* (p. 153) notes the frequency of location by water and of riverside perspectives in some instances of *clif* for example (Table 4.7, $_{\mathrm{OE}}$ *clif*[1]), but a more general relationship between hill-terms and water-features is worth exploring. If established, such a conclusion would support the contention that topographical settlement-names were important navigational aids, since human (and animal) traffic is both constrained and facilitated by water. Roads and pathways tend to seek routes of least resistance by following the same contours that create rivers, lakes and marshes. Transport by land prefers to skirt fresh water of all kinds, which whilst providing a necessity for life along the way nonetheless creates frequent barriers to travel. Settlements, of course, must be located within easy reach of fresh water and routeways almost always link settlements.

Proximity to local water-features therefore is a useful dimension to consider when seeking to judge whether a correlation exists between hill-terms and hill-classes.[221] The highly irregular shape of terrain is naturally segmented by declivities of all kinds and these most often conduct or store water, thereby delimiting natural landforms which then attract unique

[221] *Local* is ≤ 1.5 km from the edge (so perceived) of the relief-feature.

names. In compiling the corpora of this study, the repeated observation has been that the edges of named hills do not transgress locally *significant adjacent* water-features; i.e. settlement and hill will be found on the same side of significant water. If this truism appears to be contradicted, further investigation usually reveals an earlier settlement has been relocated across water from an original locus beside or upon its co-appellative. An *adjacent* water-feature does not flow away from the summit but bounds it to some degree. Here *significant* is defined as depicted > 1 mm wide on 1:5,000 scale vector basemaps. This is the same width as non-bold (non-50 m) OS contour-lines depicted at that scale. Essentially if a bounding stream appears wider than the contour-lines it crosses, it is *significant.* DEM-derived contours at 5 m intervals were used in this study as they reflect the landscape more accurately than conventional maps (rasters). Also, their dark brown coloration is easier to read than the orange used by the OS, particularly in urban areas.[222]

In attempting to locate the actual examples of *LPN*, there are occasions when two or more relief-features present as potential candidates near to the settlement. It has been found that the principle of significant adjacent water can often predict which is most likely to be the co-appellative, although in such instances the existence of multiple candidates is always flagged to show an alternative could have been selected. Such a criterion might appear to proceed from a circular argument. However, in situations of only one potential hill the observation remains true: settlements are sited on the landform from which they are called.

Table 6.4 details the six locational labels used to qualify the four hill-classes.

[222] This indispensable tool was accessed (October 2016–March 2021) from the EDINA Digimap service <https://digimap.edina.ac.uk/>.

Location	Label
bounded by the sea	**coastal**
bounded by a lake[223]	**lacustrine**
bounded by an estuary	**estuarine**
bounded by a water-course	**riverside**
hemmed by water-courses[224]	**interfluvial**
> 1 km from a bounding natural water-feature	**inland**

Table 6.4. Hill location labels.

Two optional descriptors have proven useful in adding a further dimension:

- *marshy* – these hill-classes are adjacent to or surrounded by current marshes, or else drainage systems, along with historical maps, sources, and other place-names testify to the former existence of wetlands;[225] and
- *steep* – at least one area of the relief-feature has a steeper gradient making it somewhat remarkable in comparison with the general locality.[226]

Although there are occasional instances of location + hill-class being both *marshy* and *steep* – Somerset, with four examples, has the highest incidence in the *LPN* corpus – most often these descriptors are mutually exclusive. Fig. 6.3 summarizes the complete hill classification system and illustrates typical presentations of each class as OS contour lines.

[223] As reservoirs and artificial lakes post-date the naming of *LPN*'s examples, they are disregarded.
[224] This includes relief-features lying within oxbows and at confluences with another water-feature, including lakes, estuaries, and the sea. Generally being bounded by significant water-features on two sides, not necessarily contiguous, qualifies as *interfluvial*.
[225] Logically, the *insular* hill-classes (*holm* and *island*) only occur in *riverside*, *interfluvial*, and *inland* locations when *marshy* is the descriptor. For the sake of simplicity, *riverside* can be extended to *holms* and *islands* fully surrounded by clear flowing water without the presence of marshes.
[226] In practice, contour-line spacing will be half or less than the general local landscape. This allows even for very short stretches of an otherwise gently rising feature to trigger the descriptor *steep*.

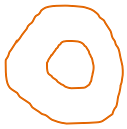
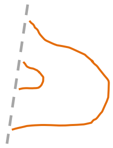
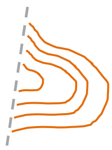
Descriptor	Location	Hill-class	Appearance
marshy	**coastal**	**platform** 	*compact, flat*
steep	**lacustrine**	**bank** 	*elongated, flat*
(none)	**estuarine**	**spit** 	*projecting, flat*
	riverside	**holm** 	*insular, flat*
	interfluvial	**dome** 	*compact, elevated*
	inland	**ridge** 	*elongated, elevated*
		headland 	*projecting, elevated*
		island 	*insular, elevated*

Fig. 6.3. Permutations of hill classification illustrated with OS contour line patterns.

Relief-features with at least one horizontal dimension in excess of 1.5 km are flagged in the datasets with '> 1.5 km' appended to the hill-classification. It is problematic to measure and compare places of this and a greater magnitude with those of more limited extent because frequently larger landforms combine multiple summits, slopes and spurs in a single entity. Conceptually, these lie at the lower end of a spectrum that designates districts rather than specific localities and points. For example, Peak Cavern DRB SK 1482 in the *LPN* corpus, is doubtless a derivative of High Peak DRB SK 1188 (< $_{\text{OE}}$ *pēac*), a name that appears to have designated a whole district rather than one eponymous *peak* even from its earliest (7th[c.1000]) occurrence as the specific of the term *Pecsætna lond* (*CDEPN*, 464).

A methodological cut-off of 1.5 km is somewhat arbitrary, and yet this does seem to reflect a real if vague boundary between place and district. It follows that the objects of the current study must designate the local and specific rather than larger zones; the greater an area the less possible it becomes to distinguish it precisely with a single descriptor: the fundamental requirement of the GCH (*LPN*, xiv). Although district-names of every scale are of interest, especially if they have become generalised from an original identifiable location, they do not properly fall within the scope of systematic naming proposed and elaborated by *LPN* and *PNL*. By making a pedestrian-scale world its primary concern, this kind of toponomastic investigation (and so toponymetry) parallels another sphere of locally-focussed historical research, genealogy, a discipline with which it shares many points of similarity. Given the foregoing, areas < 1.5 km extent will be taken as a rule of thumb to differentiate place-names which are subject to the GCH, from district-names that generally are not.

6.2 Toponymetric Analysis of *LPN* data

As with the Berwickshire datasets, the *LPN* corpus has been prepared to permit future investigation by comparing sense definitions, co-appellative types, and hill-term functions; additionally, the hill-classification system (detailed in the last section) has been implemented for the same purpose. For now, more general questions about the nature of Gelling and

Cole's examples will be explored using statistical analysis, the first step of which is to conduct an evaluation of the data in the manner applied to the Berwickshire datasets in Chapter 5. Once again, the questions are:

> Test 1: Can all elements be successfully measured using toponymetry, and if not, which elements might be evaluated and compared with examples from the LPN1 corpus?
>
> Test 2: When the exemplar relief-features of *LPN* are assessed with toponymetry, do they display a non-random relationship between hill-term and landform?

6.2.1 Test 1 – Computation Success or Failure

This test repeats the evaluation applied previously to the Berwickshire datasets (§5.5.1) with the exception that the three settlement-related parameters (•S• alt., •S•to•R• dis., and •S•to•R• gra.) are omitted for the reasons discussed under the review of the earlier results (§5.6.12). A summary of the number of tests per element failing to compute geomorphons is shown in Table 6.5. This equates to an overall failure rate of 32% compared to the 27% for Berwickshire (Table 5.6).

If the percentage of Berwickshire test failures is ranked against comparable results for *LPN*, it is noteworthy that they occur in identical descending order. This finding is significant. Having taken two samples and analysed them independently with the same procedure, the test rate success is proportional solely because of hill-terms in their names. The chance of replicating this order randomly is 1/120. Therefore, we may conclude a systematic relationship between hill-terms and the landforms they describe exists, and this demonstrates that the GCH is a statistically verifiable phenomenon.

Element	No. of Tests	Failed	Failed %
OE *ecg*	11	9	82
Brit *blakno-*	7	5	71
OE *hrycg*	69	36	52
Brit *brinn, bryn*	4	2	50
OE *sīde*	10	5	50
OE *næss, ness*	31	13	42
OE *cnoll*	22	9	41
Brit *breȝ, brig*	13	5	38
OE *clif*	118	35	30
OE *dūn*	323	97	30
OE *hēafod*	51	14	27
OE *hyll*	165	43	26
OE *hlāw*	20	5	25
OE *hōh*	146	36	25
OE *pēac, pīc*	12	3	25
OE *camb*	9	2	22
	1,011	**319**	

Table 6.5. *LPN* test failure frequency (ranked by percentage).

LPN Element	%	BWK Grouping	%
OE *hrycg*	52	RIG	41
OE *sīde*	50	SIDE	39
OE *cnoll*	41	KNOLL	32
OE *clif*	30	CLIF	0
OE *dūn*	30	DOUN	0
OE *hyll*	26	HILL	22
OE *hlāw*	25	LAW	22
OE *hōh*	25	HUCH	0

Table 6.6. *LPN* vs. Berwickshire (Table 5.6) test failure rankings.

Furthermore, it suggests there exists a hierarchy of measurability for the current version of toponymetry. Although not shown in Table 6.6, because low sample size excludes a comparison with *LPN* data, Sc1 *edge*[1] and SSE1 *edge*[1] (Table 5.6) match OE *ecg* (Table 6.5) as the least measurable hill-term, with rates of 100% and 83% respectively. This confirms the earlier observation that *edge* (§5.5.1.1) is conceptually different from the other hill-terms because it defines an intersection of landforms rather than describing one in isolation. Also, toponyms in *edge* frequently denote areas > 1.5 km in extent, which as noted previously (§6.1.3) creates issues of measurability due to their composite structure.

6.2.2 Test 2 – Element and Hill-shape Comparison

This investigation re-applies the method used for the Berwickshire datasets (§5.5.2; §5.5.2.1) with the objective of determining whether the landforms associated with the settlements cited by Gelling and Cole can be differentiated from one another as claimed.

	OE *cnoll*	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*
len.	**0.004**	**0.062**	**8.0×10^{-7}**	0.11	0.23
wid.	**3.9×10^{-4}**	0.18	**2.3×10^{-8}**	0.1	0.52
per.	**0.0025**	0.1	**6.0×10^{-7}**	0.41	0.3
mesh per.	**0.0026**	0.1	**5.9×10^{-7}**	0.41	0.31
•R• alt.	0.24	0.22	**4.8×10^{-10}**	**0.0059**	0.87
pro.	0.16	0.35	**3.4×10^{-12}**	0.1	1.0
sur.	**1.4×10^{-4}**	0.18	**4.8×10^{-13}**	**3×10^{-4}**	0.15
mesh sur.	**1.4×10^{-4}**	0.18	**4.8×10^{-13}**	**3.1×10^{-4}**	0.16

	OE *clif*	OE *dūn*	OE *hōh*
len.	**0.0011**	**2.1×10^{-6}**	**1.1×10^{-4}**
wid.	**3.8×10^{-5}**	**2.0×10^{-8}**	**5.5×10^{-7}**
per.	**0.0017**	**2.1×10^{-6}**	**3.7×10^{-5}**
mesh per.	**0.0016**	**2.1×10^{-6}**	**3.9×10^{-5}**
•R• alt.	**4.9×10^{-6}**	**6.4×10^{-10}**	**2.3×10^{-4}**
pro.	**1.6×10^{-5}**	**1.7×10^{-13}**	**1.7×10^{-9}**
sur.	**8.6×10^{-11}**	**8.4×10^{-15}**	**5.2×10^{-12}**
mesh sur.	**9.4×10^{-11}**	**9.1×10^{-15}**	**5.7×10^{-12}**

Table 6.7. Shapiro-Wilk Test of *LPN* data normality (by test group and parameter).

Table 6.7 summarizes the results of a Shapiro-Wilk Test of data normality and confirms that six of the eight *LPN* hill-terms under consideration do not have a statistically normal distribution and therefore the Kruskal-Wallis Test is the correct model to use in making multiple comparisons between hill-terms. As previously, values is **red** are statistically significant and those in **orange** are marginally so.

6.3 Testing the Gelling-Cole Hypothesis – *LPN*

Once again the hypothesis to be tested is expressed formally as $H_0 \neq H_1$:

H_0 : settlement-names were coined randomly from hill-terms

H_1 : settlement-names were not coined randomly from hill-terms.

The procedure described for Berwickshire (§5.6) is repeated for the remaining eight parameters testing the eight Old English elements in two groups: *cnoll*, *hlāw*, *hyll*, *hrycg*, and *sīde*; and *clif*, *dūn*, and *hōh*. These hill-terms have been selected because they are shared with Berwickshire and because they each have a sufficient number of examples to allow a relevant comparison of their parameters.

In the following results tables, a rejection of the null hypothesis (H_0) in favour of the alternative hypothesis (H_1) is verification that the GCH is statistically detectable in this section of the *LPN* corpus at a confidence level of 99% (α = 0.01).

The results detailed in §6.3.1–§6.3.8 are summarized in Table 6.8.

6.3.1 Length (len.)

***α* = 0.01** (Level of Confidence = 99%; df. = 7)

Null hypothesis (H_0):	**$p < \alpha$, H_0 is rejected**	Type 1 error risk:	5.399×10^{-5} (small)
p-value:	**5.4×10^{-5}**	Effect size (η^2):	0.041 (medium)
Test statistic (H):	**31.33** > χ^2 (18.48)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.34

H stat.	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	2.38	1.41	**12.77**	4.49	2.7	7.75	5.89
OE *hlāw*		1.75	2.06	0.048	0.73	2.3×10^{-4}	0.14
OE *hyll*			**16.44**	2.88	1.23	**13.51**	6.25
OE *hrycg*				0.21	9.91	5.06	6.21
OE *sīde*					1.8	0.37	0.79
OE *clif*						4.12	1.32
OE *dūn*							0.71

p-value

	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	0.12	0.24	**3.5×10^{-4}**	0.034	0.10	**0.0054**	0.015
OE *hlāw*		0.19	0.15	0.83	0.39	0.99	0.71
OE *hyll*			**5×10^{-5}**	0.089	0.27	**2.4×10^{-4}**	0.012
OE *hrycg*				0.65	**0.0016**	0.025	0.013
OE *sīde*					0.18	0.54	0.37
OE *clif*						0.042	0.25
OE *dūn*							0.40

6.3.2 Width (wid.)

***α* = 0.01** (Level of Confidence = 99%; df. = 7)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	9.996×10^{-5} (small)
p-value:	**1×10^{-4}**	Effect size (η^2):	0.038 (medium)
Test statistic (H):	**29.88** > χ^2 (18.48)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.34

H stat.	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	2.98	1.55	9.98	1.77	2.81	8.55	6.59
OE *hlāw*		1.34	0.59	0.048	0.98	0.22	0
OE *hyll*			9.12	0.31	0.19	**15.61**	6.69
OE *hrycg*				0.78	6.94	0.23	1.50
OE *sīde*					0.21	0.40	0.083
OE *clif*						9.97	4.10
OE *dūn*							0.75

p-value

	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	0.084	0.21	**0.0016**	0.18	0.094	0.0034	0.01
OE *hlāw*		0.25	0.44	0.83	0.32	0.64	1
OE *hyll*			**0.0025**	0.58	0.66	**7.8×10^{-5}**	0.0097
OE *hrycg*				0.38	**0.0084**	0.63	0.22
OE *sīde*					0.65	0.52	0.77
OE *clif*						**0.0016**	0.043
OE *dūn*							0.39

6.3.3 Perimeter (per.)

***α* = 0.01** (Level of Confidence = 99%; df. = 7)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	6.969×10^{-5} (small)
p-value:	**7×10^{-5}**	Effect size (η^2):	0.04 (medium)
Test statistic (H):	**30.73** > χ^2 (18.48)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.34

H stat.	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	2.38	1.42	**11.58**	4.92	3.1	8.24	6.3
OE *hlāw*		1.44	1.16	0.0019	0.85	0.044	0.023
OE *hyll*			**13.26**	1.83	0.74	**14.59**	6.68
OE *hrycg*				0.21	**10.38**	2.74	4.34
OE *sīde*					1.15	0.066	0.24
OE *clif*						6.22	2.2
OE *dūn*							0.72

p-value

	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	0.12	0.23	**6.7×10^{-4}**	0.027	0.078	0.0041	0.012
OE *hlāw*		0.23	0.28	0.97	0.36	0.83	0.88
OE *hyll*			**2.7×10^{-4}**	0.18	0.39	**1.3×10^{-4}**	0.0098
OE *hrycg*				0.65	**0.0013**	0.098	0.037
OE *sīde*					0.28	0.8	0.62
OE *clif*						0.013	0.14
OE *dūn*							0.4

6.3.4 Mesh Perimeter (mesh per.)

***α* = 0.01** (Level of Confidence = 99%; df. = 7)

Null hypothesis (H_0):	**$p < \alpha$, H_0 is rejected**	Type 1 error risk:	7.319×10^{-5} (small)
p-value:	**7.3×10^{-5}**	Effect size (η^2):	0.039 (medium)
Test statistic (H):	**30.62** > χ^2 (18.48)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.34

H stat.	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	2.38	1.41	**11.58**	4.92	3.1	8.13	6.21
OE *hlāw*		1.46	1.16	0.0019	0.82	0.046	0.021
OE *hyll*			**13.35**	1.79	0.77	**14.56**	6.69
OE *hrycg*				0.21	10.26	2.75	4.3
OE *sīde*					1.11	0.066	0.24
OE *clif*						6.18	2.18
OE *dūn*							0.7

p-value

	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	0.12	0.24	**6.7×10^{-4}**	0.027	0.078	0.0044	0.013
OE *hlāw*		0.23	0.28	0.97	0.37	0.83	0.89
OE *hyll*			**2.6×10^{-4}**	0.18	0.38	**1.4×10^{-4}**	0.0097
OE *hrycg*				0.65	**0.0014**	0.097	0.038
OE *sīde*					0.29	0.8	0.62
OE *clif*						0.013	0.14
OE *dūn*							0.4

6.3.5 Relief-feature Altitude (•R• alt.)

***α* = 0.01** (Level of Confidence = 99%; df. = 7)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	6.886×10^{-4} (small)
p-value:	**6.9×10^{-4}**	Effect size (η^2):	0.03 (small)
Test statistic (H):	**25.24** > χ^2 (18.48)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.34

H stat.	OE ***hlāw***	OE ***hyll***	OE ***hrycg***	OE ***sīde***	OE ***clif***	OE ***dūn***	OE ***hōh***
OE ***cnoll***	1.17	2.16	0.025	5.37	3.65	1.55	4.06
OE ***hlāw***		0.088	2.46	7.56	1.28	0.013	1.01
OE ***hyll***			5.91	6.59	2.88	0.13	2.68
OE ***hrycg***				6.17	8.4	4.44	10.21
OE ***sīde***					8.16	6.64	9.56
OE ***clif***						4.4	0.14
OE ***dūn***							4.74

p-value

	OE ***hlāw***	OE ***hyll***	OE ***hrycg***	OE ***sīde***	OE ***clif***	OE ***dūn***	OE ***hōh***
OE ***cnoll***	0.28	0.14	0.87	0.021	0.056	0.21	0.044
OE ***hlāw***		0.77	0.12	0.006	0.26	0.91	0.32
OE ***hyll***			0.015	0.01	0.09	0.72	0.1
OE ***hrycg***				0.013	0.0038	0.035	**0.0014**
OE ***sīde***					0.0043	0.0099	**0.002**
OE ***clif***						0.036	0.71
OE ***dūn***							0.029

6.3.6 Relief-feature Topographical Prominence (pro.)

***α* = 0.01** (Level of Confidence = 99%; df. = 7)

Null hypothesis (H_0):	*p*-value > α, H_0 unrejected	Type 1 error risk:	0.03316 (high)
p-value:	**0.033**	Effect size (η^2):	0.018 (small)
Test statistic (H):	**15.23** < χ^2 (18.48)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.34

H stat.	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	1.7	4.1	0.0006	0.5	0.9	2.22	2.15
OE *hlāw*		0.22	3.75	1.85	0.69	0.16	0.069
OE *hyll*			7.78	1.94	5.31	3.48	1.94
OE *hrycg*				0.23	1.58	4.25	3.78
OE *sīde*					1.1	1.49	1.52
OE *clif*						1.1	1.01
OE *dūn*							0.0024

p-value

	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	0.19	0.043	0.98	0.48	0.34	0.14	0.14
OE *hlāw*		0.64	0.053	0.17	0.41	0.69	0.79
OE *hyll*			0.0053	0.16	0.021	0.062	0.16
OE *hrycg*				0.63	0.21	0.039	0.052
OE *sīde*					0.3	0.22	0.22
OE *clif*						0.29	0.32
OE *dūn*							0.96

6.3.7 Relief-feature Surface Area (sur.)

***α* = 0.01** (Level of Confidence = 99%; df. = 7)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	5.468×10^{-5} (small)
p-value:	**5.5×10^{-5}**	Effect size (η^2):	0.041 (medium)
Test statistic (H):	**31.3** > χ^2 (18.48)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.34

H stat.	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	2.98	1.84	11.58	4.92	2.99	9.62	6.76
OE *hlāw*		1.14	0.89	0.0019	0.82	0.32	5.8×10^{-5}
OE *hyll*			10.13	1.01	0.3	**16.09**	6.25
OE *hrycg*				0.17	7.98	0.58	2.64
OE *sīde*					0.76	0.009	0.048
OE *clif*						9.38	3.03
OE *dūn*							1.2

p-value

	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	0.084	0.17	**6.7×10^{-4}**	0.027	0.084	**0.0019**	0.0093
OE *hlāw*		0.29	0.34	0.97	0.37	0.57	0.99
OE *hyll*			**0.0015**	0.32	0.58	**6×10^{-5}**	0.012
OE *hrycg*				0.68	0.0047	0.45	0.1
OE *sīde*					0.38	0.92	0.83
OE *clif*						**0.0022**	0.082
OE *dūn*							0.27

6.3.8 Relief-feature Mesh Surface Area (mesh sur.)

***α* = 0.01** (Level of Confidence = 99%; df. = 7)

Null hypothesis (H_0):	***p* < *α*, H_0 is rejected**	Type 1 error risk:	5.915×10^{-5} (small)
p-value:	**5.9×10^{-5}**	Effect size (η^2):	0.04 (medium)
Test statistic (H):	**31.12** > χ^2 (18.48)	Test power:	1 (strong)

Multiple Comparisons:

Critical value = 10.34

H stat.	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	2.98	1.78	**11.58**	4.92	2.95	9.5	6.55
OE *hlāw*		1.16	0.94	0.0019	0.82	0.33	9.2×10^{-4}
OE *hyll*			10.07	1.06	0.34	**16.13**	6.3
OE *hrycg*				0.13	8.01	0.59	2.58
OE *sīde*					0.76	0.0077	0.042
OE *clif*						9.22	2.96
OE *dūn*							1.17

p-value

	OE *hlāw*	OE *hyll*	OE *hrycg*	OE *sīde*	OE *clif*	OE *dūn*	OE *hōh*
OE *cnoll*	0.084	0.18	**6.7×10^{-4}**	0.027	0.086	**0.0021**	0.011
OE *hlāw*		0.28	0.33	0.97	0.37	0.57	0.98
OE *hyll*			**0.0015**	0.3	0.56	**5.9×10^{-5}**	0.012
OE *hrycg*				0.71	0.0047	0.44	0.11
OE *sīde*					0.38	0.93	0.84
OE *clif*						**0.0024**	0.085
OE *dūn*							0.28

Table 6.8, summarizing the foregoing results, confirms the null hypothesis (H_0) is rejected in favour of the alternative hypothesis (H_1) in the case of seven out of eight parameters. This signals that these landforms, grouped only by their names, do indeed represent discrete categories and that the hill-terms involved are not synonyms but descriptors of different hill types.

	Parameter	*Prevailing hypothesis*
§6.3.1	Relief-feature Length (len.)	**GCH** (H_1)
§6.3.2	Relief-feature Width (wid.)	**GCH** (H_1)
§6.3.3	Relief-feature Perimeter (per.)	**GCH** (H_1)
§6.3.4	Relief-feature Mesh Perimeter (mesh per.)	**GCH** (H_1)
§6.3.5	Relief-feature Altitude (•R• alt.)	**GCH** (H_1)
§6.3.6	Relief-feature Topographical Prominence (pro.)	*random* (H_0)
§6.3.7	Relief-feature Surface Area (sur.)	**GCH** (H_1)
§6.3.8	Relief-feature Mesh Surface Area (mesh sur.)	**GCH** (H_1)

Table 6.8. Results summary of *LPN* hill-term heterogeneity.

It is interesting that Topographical Prominence is the sole parameter to not confirm the validity of the GCH for these *LPN* examples. This may be connected with the fact that for technical reasons *pro*. is computed only for geomorphons classified as Peak (PK). Further investigation would be necessary to establish the actual cause or whether other factors are involved. For comparison, Berwickshire results obtained using an identical procedure are shown in the following abridged version of Table 5.8:

	Parameter	*Prevailing hypothesis*
§5.6.1	Relief-feature Length (len.)	**GCH** (H_1)
§5.6.2	Relief-feature Width (wid.)	**GCH** (H_1)
§5.6.3	Relief-feature Perimeter (per.)	**GCH** (H_1)
§5.6.4	Relief-feature Mesh Perimeter (mesh per.)	**GCH** (H_1)
§5.6.6	Relief-feature Altitude (•R• alt.)	**GCH** (H_1)
§5.6.7	Relief-feature Topographical Prominence (pro.)	**GCH** (H_1)
§5.6.10	Relief-feature Surface Area (sur.)	**GCH** (H_1)
§5.6.11	Relief-feature Mesh Surface Area (mesh sur.)	**GCH** (H_1)

(Table 5.8. Summarized results of Berwickshire hill-term heterogeneity.)

On balance, toponymetry has demonstrated hill-term heterogeneity exists between the Old English elements *clif*, *cnoll*, *dūn*, *hōh*, *hlāw*, *hrycg*, *hyll*, and *sīde* in Gelling and Cole's own examples and thus the GCH can be objectively validated through statistical analysis. But, does the phenomenon operate in the same way in Scotland?

6.4 Testing the Gelling-Cole Hypothesis – *LPN* vs. BWK

Testing of the Berwickshire (§5.6) and *LPN* (§6.3) corpora separately required a demonstration of difference between hill-term groups for the GCH to be valid. By contrast, this final set of tests will measure whether the phenomenon as demonstrated in England could also exist in Scotland. Therefore, for the GCH to operate in Berwickshire, the null hypothesis should *not* to be rejected i.e. there should be homogeneity. Formally, $H_0 \neq H_1$:

> H_0 : *LPN* and Berwickshire hill parameters are not different
>
> H_1 : *LPN* and Berwickshire hill parameters are different.

In 64 separate rounds, the two groups (*LPN* vs. Berwickshire) as eight pairs of hill-terms are compared for each of the eight parameters using the Kruskal-Wallis Test. An explanation of the resulting values can be found in Section 5.6. The results sections (§6.4.1–§6.4.8) summarize the findings regarding homogeneity. Also included are individual calculations of data normality (Norm. *LPN*, and Norm. BWK) conducted using the integral Shapiro-Wilk Test (§5.5.2.1). As before (§5.6), comparisons between the H statistic and the chi-squared value, and between the *p*-value and α show whether we 'reject the null hypothesis' (H_0) and so accept the alternative hypothesis (H_1), or we 'fail to reject' the null hypothesis (H_0). Statistically, H_0 is accepted if there exists an equal probability either group will contain the highest mean value.

6.4.1 Length (len.)

***α* = 0.01** (Level of Confidence = 99%; df. = 1)

	OE ***cnoll*** VS. ***KNOLL***	OE ***hlāw*** VS. ***LAW***	OE ***hyll*** VS. ***HILL***	OE ***hrycg*** VS. ***RIG***	OE ***sīde*** VS. ***SIDE***	OE ***clif*** VS. ***CLIF***	OE ***dūn*** VS. ***DOUN***	OE ***hōh*** VS. ***HUCH***
Norm. *LPN*	4.5×10^{-4}	**0.062**	**8×10^{-7}**	0.11	0.23	**0.0011**	**2.1×10^{-6}**	**1.1×10^{-4}**
Norm. BWK	0.004	**0.007**	**0.036**	**0.0012**	0.11	1.0	**0.082**	**0.05**
Null Hypothesis	p-value > α H_0 unrejected	p-value > α H_0 unrejected	**p-value < α** **H_0 rejected**	p-value > α H_0 unrejected	p-value > α H_0 unrejected	p-value > α H_0 unrejected	p-value > α H_0 unrejected	**p-value < α** **H_0 rejected**
***p*-value**	0.15	0.86	**1.4×10^{-5}**	**0.077**	0.85	0.12	0.24	**0.0029**
H statistic	2.06	0.032	**18.9**	3.12	0.034	2.37	1.37	**8.86**
χ^2	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64
Type 1 risk	0.1512 high	0.859 high	1.377×10^{-5} small	0.07742 high	0.8531 high	0.1235 high	0.2416 high	0.002921 small
Effect (η^2)	0.033 small	-0.0096 small	0.081 medium	0.029 small	-0.057 small	0.016 small	0.0016 small	0.068 medium
Power	0.03929 low	0.06203 low	0.3402 low	0.09237 low	0.02201 low	0.02302 low	0.0512 low	0.03755 low

6.4.2 Width (wid.)

***α* = 0.01** (Level of Confidence = 99%; df. = 1)

	OE ***cnoll*** vs. ***KNOLL***	OE ***hlāw*** vs. ***LAW***	OE ***hyll*** vs. ***HILL***	OE ***hrycg*** vs. ***RIG***	OE ***sīde*** vs. ***SIDE***	OE ***clif*** vs. ***CLIF***	OE ***dūn*** vs. ***DOUN***	OE ***hōh*** vs. ***HUCH***
Norm. *LPN*	**3.9×10^{-4}**	0.18	**2.30×10^{-8}**	0.1	0.52	**3.8×10^{-5}**	**2×10^{-8}**	**5.50×10^{-7}**
Norm. BWK	**2.4×10^{-4}**	0.0033	**0.011**	**1.3×10^{-4}**	0.086	0.92	**0.021**	**0.027**
Null Hypothesis	p-value > α H_0 unrejected	p-value > α H_0 unrejected	**p-value < α** **H_0 rejected**	p-value > α H_0 unrejected	p-value > α H_0 unrejected	p-value > α H_0 unrejected	p-value > α H_0 unrejected	**p-value < α** **H_0 rejected**
***p*-value**	0.11	0.51	**1.9×10^{-5}**	0.18	0.23	0.081	0.77	**2.2×10^{-4}**
H statistic	2.49	0.43	**18.32**	1.79	1.45	3.04	0.086	**13.64**
χ^2	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64
Type 1 risk	0.1148 high	0.5128 high	1.867×10^{-5} small	0.1815 high	0.2288 high	0.08135 high	0.7697 high	2.215×10^{-4} small
Effect (η^2)	0.046 medium	-0.0057 small	0.078 medium	0.011 small	0.026 small	0.024 small	-0.0039 small	0.11 medium
Power	0.03929 low	0.06203 low	0.3402 low	0.09237 low	0.02201 low	0.02302 low	0.0512 low	0.03755 low

6.4.3 Perimeter (per.)

***α* = 0.01** (Level of Confidence = 99%; df. = 1)

	OE ***cnoll*** VS. ***KNOLL***	OE ***hlāw*** VS. ***LAW***	OE ***hyll*** VS. ***HILL***	OE ***hrycg*** VS. ***RIG***	OE ***sīde*** VS. ***SIDE***	OE ***clif*** VS. ***CLIF***	OE ***dūn*** VS. ***DOUN***	OE ***hōh*** VS. ***HUCH***
Norm. *LPN*	**0.0025**	0.1	**6×10^{-7}**	0.41	0.3	**0.0017**	**2.1×10^{-6}**	**3.7×10^{-5}**
Norm. BWK	**4.3×10^{-4}**	**0.0085**	**0.025**	**2.4×10^{-4}**	0.55	0.42	**0.085**	**0.083**
Null Hypothesis	p-value > α H_0 unrejected	p-value > α H_0 unrejected	**p-value < α** **H_0 rejected**	p-value > α H_0 unrejected	p-value > α H_0 unrejected	p-value > α H_0 unrejected	p-value > α H_0 unrejected	**p-value < α** **H_0 rejected**
***p*-value**	0.13	0.62	**3.5×10^{-5}**	0.12	0.58	0.11	0.28	**9.1×10^{-4}**
H statistic	2.27	0.25	**17.13**	2.45	0.31	2.5	1.16	**11.01**
χ^2	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64
Type 1 risk	0.132 high	0.6202 high	3.5×10^{-5} small	0.1172 high	0.5786 high	0.1139 high	0.2818 high	9.05×10^{-4} small
Effect (η^2)	0.04 medium	-0.0075 small	0.073 medium	0.02 small	-0.041 small	0.018 small	6×10^{-4} small	0.086 medium
Power	0.03929 low	0.06203 low	0.3402 low	0.09237 low	0.02201 low	0.02302 low	0.0512 low	0.03755 low

6.4.4 Mesh Perimeter (mesh per.)

***α* = 0.01** (Level of Confidence = 99%; df. = 1)

	OE ***cnoll*** vs. ***KNOLL***	OE ***hlāw*** vs. ***LAW***	OE ***hyll*** vs. ***HILL***	OE ***hrycg*** vs. ***RIG***	OE ***sīde*** vs. ***SIDE***	OE ***clif*** vs. ***CLIF***	OE ***dūn*** vs. ***DOUN***	OE ***hōh*** vs. ***HUCH***
Norm. *LPN*	**0.0026**	0.1	**5.9×10^{-7}**	0.41	0.31	**0.0016**	**2.1×10^{-6}**	**3.9×10^{-5}**
Norm. BWK	**4.3×10^{-4}**	**0.0085**	**0.026**	**2.4×10^{-4}**	0.54	0.43	**0.084**	**0.087**
Null Hypothesis	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**
***p*-value**	0.13	0.61	**3.1×10^{-5}**	0.12	0.64	0.11	0.28	**9.1×10^{-4}**
H statistic	2.27	0.25	**17.35**	2.45	0.21	2.56	1.16	**11.01**
χ^2	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64
Type 1 risk	0.132 high	0.6136 high	3.109×10^{-5} small	0.1172 high	0.6434 high	0.1094 high	0.2818 high	9.05×10^{-4} small
Effect (η^2)	0.04 medium	-0.0074 small	0.074 medium	0.02 small	-0.046 small	0.018 small	6.7×10^{-4} small	0.086 medium
Power	0.03929 low	0.06203 low	0.3402 low	0.09237 low	0.02201 low	0.02302 low	0.0512 low	0.03755 low

6.4.5 Relief-feature Altitude (•R• alt.)

***α* = 0.01** (Level of Confidence = 99%; df. = 1)

	OE ***cnoll*** vs. ***KNOLL***	OE ***hlāw*** vs. ***LAW***	OE ***hyll*** vs. ***HILL***	OE ***hrycg*** vs. ***RIG***	OE ***sīde*** vs. ***SIDE***	OE ***clif*** vs. ***CLIF***	OE ***dūn*** vs. ***DOUN***	OE ***hōh*** vs. ***HUCH***
Norm. *LPN*	0.24	0.22	**4.8×10^{-10}**	**0.0059**	0.87	0.43	0.28	**0.065**
Norm. BWK	**0.056**	**3.7×10^{-4}**	**0.0032**	**1.2×10^{-4}**	0.11	**4.9×10^{-6}**	**6.4×10^{-10}**	**2.3×10^{-4}**
Null Hypothesis	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**	**p-value < α, H_0 rejected**	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**	p-value > α, H_0 unrejected
***p*-value**	0.43	**0.0018**	**7.4×10^{-11}**	0.21	0.64	0.13	**0.0031**	0.65
H statistic	0.64	**9.75**	**42.42**	1.5	0.21	2.25	**8.75**	0.2
χ^2	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64
Type 1 risk	0.4252 high	0.001792 small	7.37×10^{-11} small	0.2067 high	0.6434 high	0.1337 high	0.003088 small	0.653 high
Effect (η^2)	-0.011 small	0.087 medium	0.19 medium	0.008 small	-0.046 small	0.015 small	0.033 small	-0.0069 small
Power	0.03929 low	0.06203 low	0.3402 low	0.09237 low	0.02201 low	0.02302 low	0.0512 low	0.03755 low

6.4.6 Relief-feature Topographical Prominence (pro.)

***α* = 0.01** (Level of Confidence = 99%; df. = 1)

	OE ***cnoll*** vs. ***KNOLL***	OE ***hlāw*** vs. ***LAW***	OE ***hyll*** vs. ***HILL***	OE ***hrycg*** vs. ***RIG***	OE ***sīde*** vs. ***SIDE***	OE ***clif*** vs. ***CLIF***	OE ***dūn*** vs. ***DOUN***	OE ***hōh*** vs. ***HUCH***
Norm. *LPN*	0.16	0.35	**3.4×10^{-12}**	0.1	1.0	**1.6×10^{-5}**	**1.7×10^{-13}**	**1.7×10^{-9}**
Norm. BWK	0.21	**0.0013**	**0.008**	**3.1×10^{-5}**	0.16	1.0	**0.043**	0.14
Null Hypothesis	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**	**p-value < α, H_0 rejected**	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**	p-value > α, H_0 unrejected
***p*-value**	0.14	0.038	**3.3×10^{-8}**	**0.0015**	0.74	0.041	**0.0084**	**0.096**
H statistic	2.23	4.31	**30.53**	**10.06**	0.11	4.19	**6.94**	2.77
χ^2	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64
Type 1 risk	0.1356 high	0.03793 high	3.28×10^{-8} small	0.001517 small	0.7389 high	0.04074 high	0.008436 small	0.09611 high
Effect (η^2)	0.065 medium	0.038 medium	0.16 large	0.21 large	-0.15 small	0.064 medium	0.03 small	0.022 small
Power	0.02737 low	0.0536 low	0.2836 low	0.05258 low	0.0143 low	0.01623 low	0.05069 low	0.03303 low

6.4.7 Relief-feature Surface Area (sur.)

***α* = 0.01** (Level of Confidence = 99%; df. = 1)

	OE *cnoll* vs. *KNOLL*	OE *hlāw* vs. *LAW*	OE *hyll* vs. *HILL*	OE *hrycg* vs. *RIG*	OE *sīde* vs. *SIDE*	OE *clif* vs. *CLIF*	OE *dūn* vs. *DOUN*	OE *hōh* vs. *HUCH*
Norm. *LPN*	**1.4×10^{-4}**	0.18	**4.8×10^{-13}**	**3×10^{-4}**	0.15	**8.6×10^{-11}**	**8.4×10^{-15}**	**5.2×10^{-12}**
Norm. BWK	**7.2×10^{-6}**	**4.9×10^{-6}**	**2.7×10^{-6}**	**5.9×10^{-6}**	**0.014**	0.96	0.12	**0.044**
Null Hypothesis	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**
***p*-value**	0.18	0.3	**6.6×10^{-6}**	0.19	0.35	0.12	0.6	**6.6×10^{-4}**
H statistic	1.77	1.1	**20.31**	1.7	0.86	2.44	0.28	**11.59**
χ^2	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64
Type 1 risk	0.1839 high	0.295 high	6.578×10^{-6} small	0.192 high	0.3545 high	0.1186 high	0.5951 high	6.64×10^{-4} small
Effect (η^2)	0.024 small	9.6×10^{-4} small	0.087 medium	0.0095 small	-0.0084 small	0.017 small	-0.0031 small	0.091 medium
Power	0.03929 low	0.06203 low	0.3402 low	0.09237 low	0.02201 low	0.02302 low	0.0512 low	0.03755 low

6.4.8 Relief-feature Mesh Surface Area (mesh sur.)

***α* = 0.01** (Level of Confidence = 99%; df. = 1)

	OE ***cnoll*** vs. ***KNOLL***	OE ***hlāw*** vs. ***LAW***	OE ***hyll*** vs. ***HILL***	OE ***hrycg*** vs. ***RIG***	OE ***sīde*** vs. ***SIDE***	OE ***clif*** vs. ***CLIF***	OE ***dūn*** vs. ***DOUN***	OE ***hōh*** vs. ***HUCH***
Norm. *LPN*	**1.4×10^{-4}**	0.18	**4.8×10^{-13}**	**3.1×10^{-4}**	0.16	**9.4×10^{-11}**	**9.1×10^{-15}**	**5.7×10^{-12}**
Norm. BWK	**7.3×10^{-6}**	**5.1×10^{-6}**	**3.1×10^{-6}**	**5.9×10^{-6}**	**0.015**	0.95	0.15	**0.045**
Null Hypothesis	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	p-value > α, H_0 unrejected	**p-value < α, H_0 rejected**
***p*-value**	0.2	0.29	**6.2×10^{-6}**	0.2	0.31	0.12	0.61	**6.6×10^{-4}**
H statistic	1.67	1.12	**20.42**	1.68	1.04	2.44	0.26	**11.59**
χ^2	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64
Type 1 risk	0.1958 high	0.2907 high	6.204×10^{-6} small	0.1956 high	0.3085 high	0.1186 high	0.6077 high	6.64×10^{-4} small
Effect (η^2)	0.021 small	0.0012 small	0.087 medium	0.0091 small	0.0022 small	0.017 small	-0.0031 small	0.091 medium
Power	0.03929 low	0.06203 low	0.3402 low	0.09237 low	0.02201 low	0.02302 low	0.0512 low	0.03755 low

6.5 Results

In Table 6.9 (summarizing §6.4.1–§6.4.8), the symbol 'H_0' signifies that for a given parameter and hill-term pairing the GCH cannot be disproven; whereas 'H_1' signifies that the compared data are sufficiently dissimilar to conclude that the hill-terms of Berwickshire toponyms are not homogenous with equivalently-named places cited in *LPN*.

Parameter		OE ***cnoll*** vs. ***KNOLL***	OE ***hlāw*** vs. ***LAW***	OE ***hyll*** vs. ***HILL***	OE ***hrycg*** vs. ***RIG***	OE ***sīde*** vs. ***SIDE***
§6.4.1	len.	H_0	H_0	H_1	H_0	H_0
§6.4.2	wid.	H_0	H_0	H_1	H_0	H_0
§6.4.3	per.	H_0	H_0	H_1	H_0	H_0
§6.4.4	mesh per.	H_0	H_0	H_1	H_0	H_0
§6.4.5	•R• alt.	H_0	H_1	H_1	H_0	H_0
§6.4.6	pro.	H_0	H_0	H_1	H_1	H_0
§6.4.7	sur.	H_0	H_0	H_1	H_0	H_0
§6.4.8	mesh sur.	H_0	H_0	H_1	H_0	H_0
Prevailing hypothesis:		**GCH**	**7/8 GCH**	**random**	**7/8 GCH**	**GCH**

Parameter		OE ***clif*** vs. ***CLIF***	OE ***dūn*** vs. ***DOUN***	OE ***hōh*** vs. ***HUCH***
§6.4.1	len.	H_0	H_0	H_1
§6.4.2	wid.	H_0	H_0	H_1
§6.4.3	per.	H_0	H_0	H_1
§6.4.4	mesh per.	H_0	H_0	H_1
§6.4.5	•R• alt.	H_0	H_1	H_1
§6.4.6	pro.	H_0	H_1	H_1
§6.4.7	sur.	H_0	H_0	H_1
§6.4.8	mesh sur.	H_0	H_0	H_1
Prevailing hypothesis:		**GCH**	**3/4 GCH**	**random**

Table 6.9. Results summary of *LPN* vs. Berwickshire hill-term homogeneity.

The results are unequivocal: in formal terms, we 'fail to reject' the null hypothesis (H_0) that '*LPN* and Berwickshire hill parameters are not different' in the tests of OE *cnoll* vs. KNOLL; OE *sīde* vs SIDE; and OE *clif* vs CLIF – i.e. they are the same, but in the language of hypothesis testing one can only 'reject' or 'fail to reject' H_0 (§5.6).

For OE *hlāw* vs LAW; OE *hrycg* vs. RIG; and OE *dūn* vs. DOUN, there is a consistent rejection of homogeneity for •R• alt. and/or pro. A comparison of the actual parameter values shows why this is the case (Table 6.10). Scottish DOUN, LAW, and RIG, have substantially greater altitudes compared with their Old English equivalents in England. The reasons for the disparities of pro. for DOUN and RIG relative to OE *dūn* and OE *hrycg* require further investigation; e.g. researching whether such variation is perhaps caused by differences of dialect.

•R• alt.				
OE ***dūn***	135 m (*n* = 232)	>	221 m (*n* = 9)	**DOUN**
OE ***hlāw***	149 m (*n* = 11)	>	241 m (*n* = 113)	**LAW**
OE ***hrycg***	139 m (*n* = 69)	>	209 m (*n* = 73)	**RIG**

pro.				
OE ***dūn***	55 m (*n* = 209)	>	73 m (*n* = 9)	**DOUN**
OE ***hrycg***	64 m (*n* = 24)	<	36 m (*n* = 29)	**RIG**

Table 6.10. Mean values of •R• alt. and pro. in *LPN* (left) and Berwickshire (right) corpora.

Equally striking in these results is the complete rejection of the null hypothesis across all parameters in the case of OE *hyll* vs. HILL and OE *hōh* vs. HUCH. There is no immediately obvious explanation for this. Increasing the sample size for HUCH (*n* = 8) might generate a more characteristic picture for this rare element (in Scotland). It would also be interesting to re-examine the dataset for HILL, as this grouping is likely to be skewed by the abundance of place-names in SSE *hill* (*n* = 101). Nurminen finds OE *hyll* to have a more specialized application than ModE *hill* in neighbouring areas of England (*HPND* 91, 268), and the results for Berwickshire confirm that statistically OE *hyll* ≠ HILL. Drilling down into an expanded dataset for HILL, segmented by hill-term function (§4.2.4), might establish where and when OE *hyll* developed a non-specialized application and perhaps date its continuing predominance as the main lexical term for elevated terrain in modern varieties of English.

Subtler differences may exist than have been detected by this first iteration of toponymetry, but on balance, a direct comparison between eight *LPN* landforms and their Scottish equivalents does lead to the conclusion that systematic place-naming, broadly in the manner proposed by the GCH, has operated in Berwickshire.

RESEARCH CONCLUSIONS

Chapter 7

7.0 Summary

This chapter reviews the main findings of Chapters 2–6 (§7.1) and expands this summary to answer the four thesis questions (§7.2–§7.2.4). Issues and shortcomings with the adopted methodology are explored along with reflections on alternative approaches (§7.3). Possible implications of the research conclusions follow (§7.4), and finally an interpretation of the findings relative to human perceptions concludes the discussion (§7.5).

7.1 Review

Over a third of this thesis is concerned with avoiding ambiguity over what is being compared and tested. In developing a science-based approach to authenticate claims concerning past human perceptions of landscape, it has been necessary to depart somewhat from more familiar toponomastic procedures and to import and elaborate ideas and tools from other disciplines. A key practice (borrowed from accountancy and general science) is that of providing an audit trail of evidence so that researcher interpretation in the preparation of data is transparent, replicable, and avoids the hazard Computing Science labels with the acronym, *GIGO*: 'garbage in, garbage out […] used to express the idea incorrect or poor-quality input will produce faulty output' (*OED2* GARBAGE[6a] *n*.). The *Appendices* (Vol. II) and *Atlas* (Vol. III) provide fully annotated data and results for every place-name considered in this study, and detail any that came to be excluded with the reasoning for rejection in each instance. Therefore, as far as practicable, variables in the test corpora have been controlled so as to isolate and test only the hill-term variable.

Having assembled one *audited* corpus of Berwickshire toponyms and another of 'canonical' examples from *LPN*, an identical unsupervised (§5.0) procedure was applied to each. This quantified the spatial dimensions of the actual landforms most likely to have inspired the naming of settlements. It is important to reiterate that whilst the expanded working definition of the GCH (§2.3) is faithful to the central premise of *PNL* and *LPN*, it deliberately leaves open questions about its origin and floruit, thereby admitting the possibility that Scottish examples dated after c. 1100 can be legitimately compared with was is claimed to be, in origin and operation, a predominantly early Old English naming system. In the context of this thesis, 'testing the GCH' equates to demonstrating hill-terms are deployed systematically in the coining of topographical settlement-names.

The *Extended Geomorphon* software (§5.3) proved unable to satisfactorily quantify every landform, but 68% of the *LPN* corpus (Table 6.5) and 73% of the Berwickshire corpus (Table 5.6) did generate usable measurements. This high incidence of failure precipitated a separate investigation to determine whether certain hill-terms are less quantifiable using the current version of toponymetry – this being a test of the methodology rather than an attempt to answer which hill-terms fall within the scope of the hypothesis (§7.2.2). Ranking test failures for each corpus by descending incidence (Table 6.6) produced the unexpected result that the order of cognate hill-terms in one independently matched the other. Although between a quarter and a third of each dataset could not be measured, the very low probability (0.83% or 1/120) of randomly replicating parallel degrees of non-measurability suggested that place-names, grouped only by their generic element, are indeed differentiated systematically. Determining whether the ordering of test failure rates for specific hill-terms represents some kind of toponymetric constant would require an examination of multiple additional corpora.

The main test of the GCH was three-fold. As synonyms are inadmissible to the naming system (*LPN*, xiii), it follows that the ranked medians of relief-feature measurements (the Kruskal-Wallis Test – §5.5.2.1), grouped by hill-term, should be statistically differentiated. Firstly, Berwickshire hills and hill-spurs were quantified using 11 parameters (§5.6.12), three of which were found to be randomly distributed and therefore irrelevant for current purposes. The rejected parameters relate not to the relief-feature directly but to its associated settlement. Common sense suggests such a metric should not be systematic in place-names descriptive of hill-shape, and this proved to be correct. Yet, as a test control, these three parameters were identified solely by a statistical analysis of the data, thereby confirming the software is capable of generating unusable measurements, which in turn are amenable to interpretation by the selected hypothesis testing method. Indeed, the remaining eight parameters did return statistically significant results: the superordinate groups (§5.5.2) *BANK*, *BRAE*, *CLIF*, *DOUN*, *HILL*, *HUCH*, *KNOLL*, *LAW*, *RIG*, and *SIDE* (Table 5.8) are not synonyms.

Secondly, *LPN* data were subjected to an identical test using the same eight parameters of hill-shape (§6.3), one of which (*Topographical Prominence*) proved to be randomly distributed for reasons that would require further investigation. Analysis of the remaining seven parameters established that the Old English elements *clif*, *cnoll*, *dūn*, *hōh*, *hlāw*, *hrycg*, *hyll*, and *sīde* in Gelling and Cole's own examples can be differentiated statistically and, as was the case for Berwickshire, these are not synonyms (Table 6.8).

Therefore, on balance, in two separate identical rounds of measuring and statistical hypothesis testing, the systematic coining of place-names, descriptive of discrete hill-shape categories, was detected (§7.2.4). Hill-terms do indeed describe different kinds of hill as the GCH predicts.

And finally, cognate hill-terms from Berwickshire and Gelling and Cole's *LPN* examples were compared. In 64 separate rounds (eight comparisons of eight parameters) the Kruskal-Wallis Test (Table 6.9) established that Scottish and English landforms are <u>not different</u> across all parameters for $_{OE}$ *cnoll* vs. KNOLL, $_{OE}$ *sīde* vs SIDE, and $_{OE}$ *clif* vs CLIF; across seven out of eight parameters for $_{OE}$ *hlāw* vs LAW, and $_{OE}$ *hrycg* vs. RIG, and across six out of eight parameters for $_{OE}$ *dūn* vs. DOUN. A systematic relationship across all parameters was not established for $_{OE}$ *hyll* vs. HILL and $_{OE}$ *hōh* vs. HUCH. The possible reasons for the GCH being rejected wholly or in part for certain hill-terms are explored in Section 6.5. However, the implication is that systematic naming does generally function in similar ways south and north of the Tweed, but two parameters (*Relief-feature Altitude* and *Relief-feature Topographical Prominence*) show a less systematic association, and two particular hill groupings, on the basis of available evidence, do not demonstrate the functioning of the GCH in Berwickshire (§6.5). Section 7.2.1 reflects further upon these findings.

7.2 Research Answers

Having reviewed the general research conclusions, the four research questions will now be considered in turn.

7.2.1 Does the Gelling-Cole Hypothesis operate in Berwickshire?

Yes. Of the original 11 test parameters (§5.6), only the three that do not relate to hill-shape were found to be statistically irrelevant for differentiating ten superordinate hill-term groups. Comparisons of the eight remaining parameters grouped only by cognate hill-terms (§5.6.1–§5.6.4; §5.6.6–§5.6.7; §5.6.10–§5.6.11) concluded that the landforms denoted are not homogenous; they are different kinds of hill and so their generics are not synonyms. Therefore, systematic naming – the GCH – has operated in Berwickshire.

As an experimental control, eight Old English hill-terms were tested with an identical methodology across the same eight parameters using 873 of Gelling and Cole's own examples (Table 6.1). This independently demonstrated for all parameters except *Topographical Prominence* (pro.) that settlement-names were not coined randomly from hill-terms (Table 6.8). Toponymetry was able to detect the GCH operating in Gelling and Cole's own examples.

Statistical tests (§6.4.1–§6.4.8) comparing *LPN* and Berwickshire relief-features show empirically that the superordinates KNOLL, SIDE, and CLIF are not different from English landforms with equivalent Old English hill-terms across all parameters (§6.5). This is equally true of LAW, RIG, and DOUN except for parameters related to altitude. HUCH does not appear to support the GCH on the basis of the eight Berwickshire tests of six toponyms, but small sample size cautions against this being a definitive conclusion. The comparison between $_{OE}$ *hyll* and HILL is similarly not proven. The last appears skewed by an over-representation of names unattested before 1700. This mirrors the abundance of examples collated by *NPSB* for Dumfriesshire, Roxburghshire, and Selkirkshire (Table 3.2) and agrees with the findings of *HPND* for Northumberland and County Durham (§3.1.3.1). It is probable this ubiquitous hill-term has been attributed epexegetically in the modern era and therefore does not reflect systematic naming as defined here (§2.3). Identified solely by statistical analysis, the fact that HILL alone is found to be unlike other hill-terms confirms the methodology is able to detect such differences.

7.2.2 Which hill-terms fall within the scope of the Gelling-Cole Hypothesis?

The answer to this question can only be provisional ahead of the completion of national place-name surveys and the development of specific methodologies to quantify the majority of hill-terms. Table 4.7 demonstrated that not every hill-term sense is relevant, and issues such as terrain destruction, and even conceptual considerations (e.g. $_{\text{OE}}$ *ecg* – §5.5.1.1), prevent the generation of consistent metrics for all available examples. The rarity of some hill-terms will always preclude the possibility of obtaining a statistically robust sample with which to objectively test for the phenomenon.

Nonetheless, the methodology used to create the Berwickshire and *LPN* corpora has been designed in anticipation of efficiently measuring very large datasets as the volume of reliably etymologized topographical settlement-names steadily grows. The systems of toponymic triage (classifying hill-term senses, grammatical function, co-appellativity, and excluding weakly evidenced examples, derivatives and transferred names) and hill classification labelling (§6.1.3) are fundamental to facilitating dataset segmentation and targeted investigations. Where it *has* been possible to measure using toponymetry and where the sample size is sufficient to be significant (e.g. the eight common Old English hill-terms – §7.2.1) the GCH has been found to operate. Given this evidence, it is counter-intuitive that rare and presumably more specialized hill-terms would not also be used systematically, although for the present that remains untested.

The answer to this question, therefore, is that the commonest hill-terms originating in Old English and Older Scots (as found in Berwickshire place-names) fall within the scope of the GCH, but not every example is admissible due to the range of topographical and non-topographical senses these connote. The relief-feature elements indexed in *Appendices I*, *J*, and *L* (Vol. II) provide the most definitive answer currently available.

7.2.3 Is the Gelling-Cole Hypothesis a uniquely Old English phenomenon?

No. Table 2.2 illustrated that 18 of the exemplar 47 hill-terms cited by *LPN* are either Celtic (8) or Old Norse (10) in origin and it is likely they functioned similarly in these languages before their admission to the toponymicon of Old English. Berwickshire furnishes very few settlement-names with Celtic hill-terms and so comparisons are not possible, and Old Norse is almost completely absent from the county (fn. 207). More generally, although the 12 elements of Celtic origin distributed across four *LPN* toponymic classes may be loan-words (*LPN*, 159) or part assimilation of earlier names, it is more difficult to agree that 'some Old Norse terms were integrated into the vocabulary' (*LPN*, xvi) when in truth just under a quarter of the elements cited in demonstration of the GCH are of Old Norse origin (Table 2.2). The high incidence of Old Norse coinings cannot predate the late eighth century when the Viking incursions commenced. Furthermore, 34.42% of the total *LPN* corpus could not have been coined before c. 600 (§2.2.4) – the period after which 'the full glory of the topographical vocabulary' is believed to have begun to wane (*LPN*, xvi; xix) – due to the distribution of *LPN* examples relative to the spread of Anglo-Saxon settlements by that date. Thus, the origins and floruit of the GCH cannot be confined largely to the fifth- and sixth centuries as claimed (*LPN*, xvi).

Over half a millennium later, the two Scottish superordinate groups BANK and BRAE (§5.5.2), both of which appear to first enter Early Scots from contact with Middle English rather than directly from Old English (*CSD2* s.vv. See Table 4.7), have been used to coin Berwickshire place-names in the manner predicted by the GCH. This confirms Nurminen's observation of toponyms in Northumberland and County Durham where the GCH is detectable long after the Old English period and appears to extend even to some names coined in Modern English (*HPND*, 269–271).

The contribution of Old Norse to the development of the GCH seems not only to post-date the proposed sudden origin and dissemination of systematic place-naming in sub-Roman Britain, but the high number of cognates and parallel usage strongly suggest a common North-west Germanic tradition gave rise to a shared naming system in Old English and Old Norse, which most probably had its origins in Continental Europe at a much earlier date. At present, this suspected aetiology cannot be verified, but it does fit the known facts and allows for a gradual genesis of systematic naming without the complication of having to account for how Old Norse speakers adopted an Old English paradigm more or less immediately upon their arrival in Britain.

7.2.4 Can the Gelling-Cole Hypothesis be objectively validated through statistical analysis?

Yes. Specification of a single NGR for each relief-feature computes metrics without further researcher input. The range of parameter values thus generated is unforeseeable and the relationship between statistical groups remains unknown until after hypothesis testing has been conducted. Although landforms with curtailed and distended computations (§5.5.1) are manually excluded prior to an automated statistical analysis of the final datasets, there is no other intervention that could influence the outcomes tabulated in Chapters 5 and 6. The methodology is objective, transparent, and replicable. Furthermore, all toponyms examined in the course of the research have an audit trail, which documents the decisions of how data were rejected or selected for testing. The attribution of co-appellative codes permits the degree of inference in dataset preparation to be recognized at a glance and although the analyses presented here have not utilized this capability to further segment the corpora, the potential to grade datasets by levels of inference is now available.

Finally, since statistical hypothesis testing is able to scientifically verify the phenomenon Gelling and Cole discovered, then Q.E.D. the labelling of the GCH as a *hypothesis* is shown to be justified (§2.4.1).

7.3 Discussion

Chapters 4, 5, and 6 focussed on developing and implementing a consistent methodology to permit a like-for-like comparison between place-names grouped only by their generic elements. To recapitulate, such sifting established: whether a particular relief-feature as the plausible inspiration for coining a settlement-name can be identified; which sense definition of the test element is present; the degree to which researcher inference relative to documentary evidence is a factor; the grammatical function of the test element; whether only one hill-term is applicable, given the terrain and the weight of supporting historical evidence; the classification by shape and location of the denoted landform; and where along a chronological continuum of language stages the earliest attestation of the toponym is currently located (§1.4.2.1). Although these classifications are a pragmatic response to the nature of the available data, they evolved over the course of the research, and with hindsight certain early categorizations waned in significance as the core methodology emerged. Examples of this include: geomorphon codes, and the separation of co-appellative relief-features from singletons.

Prior to achieving the extraction of geomorphon codes for individual loci (§5.2.2; §5.2.2.1; §5.4.4), it was speculated that a simple analysis of codes vs. hill-terms might suffice to demonstrate systematic settlement-naming relative to specific landform types. This proved not to be the case; the software *does* differentiate peaks and ridges, etc., to some extent, but a single geomorphon code is too crude a metric to characterize the complex shape of most hills in the real world. Hence, although geomorphon codes are provided for each toponym in the *Appendices*, these are merely illustrative rather than being critical to toponymetry as it has evolved so far. The discovery that such codes were insufficient of themselves led directly to an investigation of the geomorphon polygon as a possible means to generate more representative metrics, albeit this solution too is likely to benefit from further refinement (§8.1).

Similarly, no attempt has been made to further examine whether hill-terms, applied to relief-features as co-appellatives, differ in character from those that lack an identifiable associated settlement. At present, there are too few early recorded singleton relief-feature names to furnish reasonable comparisons. A representative statistical *population* might be amassed once the national place-name surveys of Scotland and England are complete, but currently too few soundly etymologized examples have been published. Hence, although quantified results for these two groups have been assigned to separate *Appendices*, in practice hills with and without co-appellative settlements were compared as a single group under their common hill-term. Nonetheless, the full data are presented separately to facilitate if necessary their closer investigation in future. It might transpire that developing the collated – but unanalysed – *NPSB* data for Dumfriesshire, Roxburghshire, and Selkirkshire could result in statistically robust samples and so allow an investigation of whether significant differences do exist in reality (§8.2).

A further unpursued line of enquiry would be an extension to Berwickshire of the hill-classification system developed for the *LPN* corpus (§6.1.3). To do so currently was not vital to the main line of research since the study area, being largely rural in character, does not present the same challenges as do relief-features in many urbanized parts of England, where, due to the high incidence of anthropogenic landscape modification (calculated at 47% of *LPN* (Chapter 5) examples – §6.1.2), a mechanism was required to screen out those liable to skew toponymetric values. As a second defence, any loci that did generate curtailed or distended polygons needed also to be excluded manually before statistical analysis. Since it could be argued this selectivity introduces experimental bias, a system of categorization became necessary to chart whether all hill-terms vis-à-vis landforms were equally impacted. Hence, those *LPN* examples, rejected before and after toponymetry, have been retained in unanalysed datasets (*Appendix M* and LPN3.9) to fully document how exclusion has been applied. Some elements did completely elude quantification (e.g. $_{\text{OE}}$ *ecg)* and further developments of the software would be required to tackle linear features named with $_{\text{Sc}}$ *kame*, for example, but otherwise non-measurability can be seen to occur quite independently of researcher selection (§5.5.1.1).

One drawback of not extending the same system of classification to the Berwickshire corpus is that, on an observational level, no systematic comparison with the loci of *LPN* has been possible. This aspect will be considered separately in Section 7.5.

The vexed issue of identifying the language of origin and time-depth of toponyms in a Scottish context and the working solution adopted here have been discussed (§1.4.2.1; §5.5). As with the other previously mentioned classification methods, segmentation of the Old English > Scots language continuum by chronological stages can be seen as preparatory to a future more fine-grained analysis. The original purpose of language stage labels (e.g. $_{\text{OE}}$ *dūn*; $_{\text{ESc}}$ *doun*, etc.) was to provide an additional attribute for investigation and comparison, had the software development failed to deliver a satisfactory method of landform quantification. Although segmentation of the continuum ultimately proved to be unnecessary for present comparisons between corpora, it does lay the foundation for exploring broader questions of hill-term chronology and issues of geographical variability and dialect (§2.2.1; §2.2.3; §3.1.2.2; §3.1.2.3; §6.5).

Despite considerable efforts to eliminate variables that could adversely affect the composition of test corpora, several unresolved practical issues remain. The most critical of these concerns the extent to which it is possible to isolate and test only co-appellative settlement-naming whilst excluding back formations and derivatives (§4.2.1.6). Gelling (1998, 78) strongly refutes the notion Old English settlements were renamed as a subsequent event from previously-named topographical-features. She insists the name of settlement and site were coined simultaneously, to which must be added the proviso that the hill, for example, might not bear an actual name as a separate entity (§4.2.3). With reference to $_{\text{OE}}$ *dūn* the situation is more complex:

> Earlier commentators give the impression that a name in *dūn* will usually have been coined to describe a hill, and the nature-name thus created will later have been transferred to a nearby farm or village. This process certainly happened. Among instances in which the name clearly refers to the hill, and only secondarily to the village, may be cited Bredon WOR, Breedon LEI, Pilsdon and Blackdown DOR, Bleadon SOM, Raddon DEV, Churchdown, Oxenton and Dixton GLO, Brandon NFK, Puleston SHR, Quorndon and Bardon LEI, Baildon YOW, Billington LNC. But these are outnumbered by examples in which the village is on top of the hill, not beside it, and in which it seems more likely than not that the village was there when the English arrived. In many instances I believe the *dūn* name to be an English place-name given to a pre-English settlement in recognition of its characteristic situation.
> (*PNL*, 142)

That past commentators have frequently misunderstood this aspect of the GCH (*LPN*, xvii; §4.2.3) is not surprising; in practice separating co-appellatives from back-formations and derivatives is often not straightforward.

A broad examination of the entire *REELS* dataset (Table 4.11), comprising all OS classes mostly at 1:50,000 scale (§4.2), showed that topographical formations account for around half the place-names of Berwickshire. However, as was observed, one quarter (244/961; 25.4%) of settlement-names are co-appellative with a proximal hill, whilst eight out of ten named hills (270/322; 83.9%) are co-appellative with a settlement. Therefore, relief-features are far more likely to share their name/identity with a settlement than vice-versa (§4.2.6). What appears superficially to be simultaneous naming/identification is likely in many instances to be the eponymous hill acquiring its own name as a separate entity after an interval of time. This is frequently signalled by an epexegetic suffixed to a settlement-name. Although the naming sequence of such examples is usually undocumented, those examined in detail (Horseley Hill •R• vs. *Ward Law •R•; Swinton Hill •S• <> Swinton Hill •R•; and Trabrown Hill •R• <> Trabrown •S• – §4.2.4) show that when sufficient evidence exists, many could not have been coined simultaneously. The flagging of toponymic function and especially the isolation of what are here termed *secondary generics* (G_2) begins to address this matter by separating such usages as far as possible. Nevertheless, the issue of including only test examples that conform completely to the notion of simultaneous naming cannot be resolved further at present.

Although unproven, there is a reasonable likelihood the bundling of primary and secondary generics as a test group lies behind the complete failure of HILL vs. $_{\text{OE}}$ *hyll* to demonstrate the GCH (§6.5). Three pieces of evidence suggest this: the strongly asymmetric ratio of relief-features sharing settlement-names (noted in the previous paragraph); Nurminen's conclusions regarding the application and incidence of $_{\text{ModE}}$ *hill* in neighbouring Northumberland and County Durham (*HPND* 91, 268; §6.5); and the fact $_{\text{SSE/ModE}}$ *hill* continues as the main lexical term for elevated terrain of all kinds regardless of shape – it is clear that names in *hill*, first recorded in modern times, can manifest many varieties of shape that are not properly admissible for comparison with $_{\text{OE}}$ *hyll*.

The potential for instances of irregular naming presents another hazard to confirming the proposed ubiquity of a general naming system. These include the nexus of influences associated with polysemy, arbitrariness, and dialectal/geographical variation. One or all of these may at times have influenced the selection of generic elements by the coiners of place-names.

In the present study, the risk from polysemy has been controlled as far as possible by the creation of Table 4.7, which requires every toponym to be assigned a sense definition of best fit based on available evidence. This assumes such senses – as they are currently understood – correspond to the shared perceptions of people many centuries ago whilst also acknowledging there exists in some instances clear evidence for regional variation of meaning and application, as Gelling frequently acknowledges (*PNL*, 85, 142; Gelling 1998, 76–77; *LPN*, xv, 37, 186). The very different senses of OE *hlāw*, for example, delineate well defined geographical zones (Table 4.7, s.v.).[227] Similarly, local custom and even fancy may at times have played a role in establishing a place-name, and so too might the geographical distribution of particular landforms (e.g. OE *bæc* – *LPN*,144–145). In truth, it is seldom possible to conclude categorically that elements are being consistently used to describe geomorphological perceptions rather than stemming from other motivations.

This enigma of generic element consistency was thoroughly explored by Nurminen (§3.1.3.2), who concluded an alternative model to the one *HPND* employs is necessary to test the GCH (*HPND*, 269, 316 – §2.1.2). For *consistency* of application, she substitutes the concept of frequency across a spectrum of meaning, with specialized meanings being those that occur most frequently (*HPND*, 316). The solution applied here has been to accept, as does Gelling (*PNL*, 124; Gelling 1998, 76–77), that variation and inconsistency between and within generics is a fact. Yet equally, the sheer volume of examples in test corpora ought to compensate for and smooth out inconsistencies. In effect, toponymetry seeks to minimize the problem of inconsistency by increasing sample size. And incidentally, this emulates Gelling and Cole's own approach in using a plethora of illustrative instances to posit a phenomenon of systematic naming exists and can be observed (*LPN*, xv).

7.4 Possible Implications

Is the Gelling-Cole Hypothesis a uniquely Old English phenomenon? (§1.3.3) has been answered in the negative (§7.2.3). As a strand in the hypothesis, the proposed inception and sudden widespread establishment of systematic place-naming by Germanic immigrants

[227] However, note that a tumulus sense has been recorded in Scotland for Sc *law* (*PNFIF5*, 421).

to sub-Roman Britain seems now untenable (§2.2.3; §2.2.4). Since Old Norse speakers in the Danelaw appear to have used the same system centuries later, we are bound to ask how this could have arisen (§2.2.5; §2.2.6). Likewise, the waning and attenuation of the system's precision, claimed to have begun from the seventh century, is refuted both by Nurminen (*HPND*, 269–271) and the present analysis of hill-terms documented before and after the twelfth century. In particular, toponyms, examined here under the language groupings BANK and BRAE, continue to demonstrate the longevity of the phenomenon far beyond the main floruit proposed by Gelling and Cole. Berwickshire place-names cannot antedate the borrowing of these hill-terms into Early Scots from Middle English since a direct transmission from Old Norse, as their ultimate source, is highly unlikely in the study area (§1.4.2.1; §5.5). This conclusion begins to respond perhaps to Nurminen's question, which was the initial catalyst for this study (*HPND*, 317; §1.3.1).

The way is now clear to broaden the investigation of systematic place-naming in the manner demonstrated by *LPN*, but outwith the territory that became England, the Old English language, and beyond the early centuries during which both that state and its vernacular rose to prominence. Far from undermining the validity of the GCH, this reassessment behoves researchers to test whether similar systems can be detected elsewhere and in other languages; indeed, whether topographical settlement-names, employing a parallel rich and nuanced vocabulary of generic terms, is in fact a universal of pre-industrial western European societies.

Although the three other research questions (§1.3.1; §1.3.3; §1.3.4) have been answered in the affirmative (§7.2.1; §7.2.3; §7.2.4), a large proportion of Berwickshire place-names remains still to be explored. *Hills, Slopes, and Ridges* (*LPN*, Chapter 5) accounts for only a quarter of the examples cited in support of the GCH. The study area offers a rich and varied landscape of place-names to investigate the other six classes (see *Appendix O*).

Lexicography is a discipline that would undoubtedly benefit from such an exercise. Even within this fairly brief survey, focussed primarily on hill-terms, a surprising number of unattested Early Scots words have emerged. These frequently antedate the current earliest dictionary entries by several centuries.[228] Occasionally, such historical forms bridge a gap in the linguistic continuum between Old English and Middle Scots (e.g. ESc **crumb*). In other instances, it is apparent certain Old English elements passed into Early Scots, but underwent a narrowing of connotations (e.g. OE *hōh* > MSc *heuch*); or were suppleted by other terms (e.g. OE *clif*^{4} replaced by ESc *crag* and Sc *scaur*); or suffered both processes (OE *clif*^{2,3} > ESc *clif*^{2,3} which later ceased as a productive term and merged eventually with less specific MSc *law*). A thorough investigation of the chronological sequencing of southern Scottish hill-term senses would be a very useful toponomastic tool. For the present, it has only been possible to touch in passing upon these and related matters.

Geoscience, and in particular geomorphometry (§5.2), has created and developed the automated characterization of landforms. The increasing availability of very accurate LiDAR mapping data (§5.2.1) means hitherto unforeseen applications of geoscientific tools have the potential to create wholly new ways to investigate place-names. Automation and accuracy combine to make real the prospect of indexing all landforms across whole countries relative to names coined in any language. Therefore, toponymetry as it develops could increasingly exploit the fact Gelling and Cole illustrate so clearly: the modern landscape (with all the necessary caveats – §6.1.2) provides a quantifiable constant against which to measure historical language use and change (*LPN*, xiv).

[228] Examples include: ESc ***bell*** 'bell-shaped' (*e13* – §4.4.2); ESc ***clarty*** 'dirty, muddy, sticky' (c. 1170 – §4.3.1); ESc ****clif***^{2} 'steep escarpment' (1336×1337 – §4.3.7; §4.3.7.1; §4.3.7.2); ESc ****clif***^{3} 'small hill or bluff' (1367–8 – §4.3.9); ESc ****crumb*** 'bent, crooked' (< 1528, ESc by association with **clif*^{2}); ESc ?***helde*** 'inclined plane; a long (horizontally) straight slope varying only little in steepness' (1222 – §4.5.4); ESc ***hesill*** 'hazel' (*e13* – §4.4.1.1); ESc ***huch***^{1} 'point of land formed like a heel' (c.1200 – §4.2.1.4); ESc ***huch***^{3} 'a precipice, cliff, or scaur' (×1203 – §4.4.2; Fig. 8.1); ESc ***milke*** 'milk' (c. 1175×1190 – §4.3.4); Sc ***rashie*** 'overgrown with rushes' (1752×1755 – §4.5.2); ESc ***schit*** 'excrement' (*e13* – §4.2.2); ESc ****s(c)holch*** 'awry, winding, sloping' (1336×1337 – §4.3.7); ESc ***schule*** 'shovel' (1336×1337 – §4.3.7); ESc ?***wardlaw*** 'watch hill, look-out hill' (c. 1250 – §4.2.4).

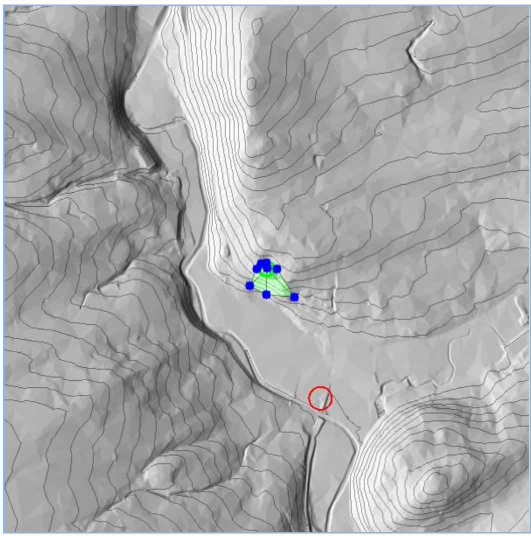
7.5 Results and Human Perceptions

The GCH is a product of human perception, although testing that dimension has not been the focus of this thesis (§1.2.3). As suggested (§7.3), the system of hill classification, which categorizes hill-shape/height and relationship to water-features (§6.1.3), might have been developed further to facilitate comparisons between Berwickshire hill-terms and the examples of *LPN*. Such a perception-led approach, using the attribution of standardized labels to compare datasets, was *HPND*'s solution to testing the GCH (§3.1.3.2). In addition to the development of manual hill classification, the present study also ascribed language-stage labels to test data. These two indices, although ultimately superseded, were retained as elements of a fallback methodology for use in the event the highly experimental application of geomorphons proved unable to deliver usable metrics. Their relegation stemmed from a claim by the creators of the original geomorphon software that appeared to offer a radically different means of analysis: 'our algorithm attempts to mimic the classification process carried out by a human analyst' (Jasiewicz and Stępiński 2013, 148). Investigating this potential shifted emphasis away from human perception and towards *computer vision* (§5.2.2), which in turn prioritized verification of the systematic (i.e. non-random) aspect of the GCH over human interpretation.

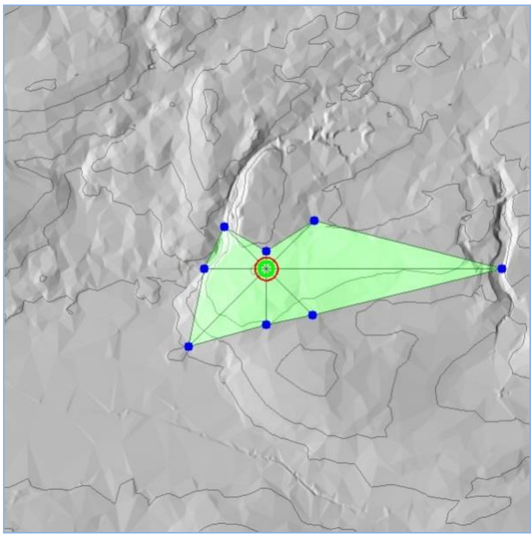
Integral to the concept of co-appellativity is a requirement to locate and specify co-ordinates for both complements – the hill as well as its associated settlement. Therefore, the toponyms listed in *Appendices I*, *J*, and *L*, have each been matched to one actual hill or hill-spur, identified strictly by reference to the sense definitions of Table 4.7. These include, wherever possible, exact descriptions collated from *PNL* and *LPN*. Thus, it is Gelling and Cole's own observations of hill-term application that have guided the identification of every relief-feature tested. Conforming closely to a common standard ensures the matched English and Scottish elements do represent landforms that are genuinely comparable.

Notwithstanding this difference of emphasis, is Sc *doun* in Berwickshire liable to be the sort of 'flat-topped hill[~~s~~] suitable for village-sites' (*PNL*, 142) that Gelling described for OE *dūn* in England? Although *LPN* gives two other sense definitions besides an elaboration of this one, the qualified answer is: yes. The sections of Table 7.1 present all the Berwickshire examples of the superordinate DOUN that were compared to the *LPN* examples of OE *dūn*. The hill-terms in each case are shown in bold. The relief-features, located by referring to the human perceptions presented as sense definitions in Table 4.7, are quoted to allow a direct comparison with the corresponding *Atlas* image (Vol. III).

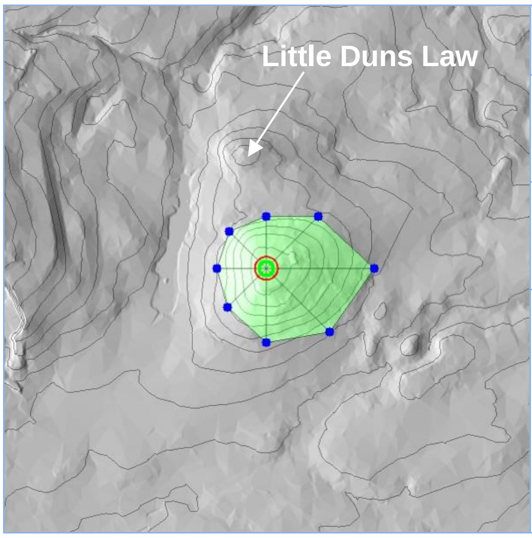
Table 7.1. Toponymetric images for DOUN *cf*. Table 4.7:



OE1 ***dūn***^{1}
**Arkils dūn* EAR •R• *NT 56905 38976
Earlston EAR •S• NT 57217 38241
OE *dūn*^{1iii} 'an uninhabited hill adjacent to a settlement'.



OE1 ***dūn***^{1}
**Goru dūn* GOR •R• *NT 64624 42981
Gordon GOR •S• NT 64624 42981
OE *dūn*^{1i} 'consistently used in settlement-names for a low hill with a fairly level and fairly extensive summit which provided a good settlement-site in open country'.

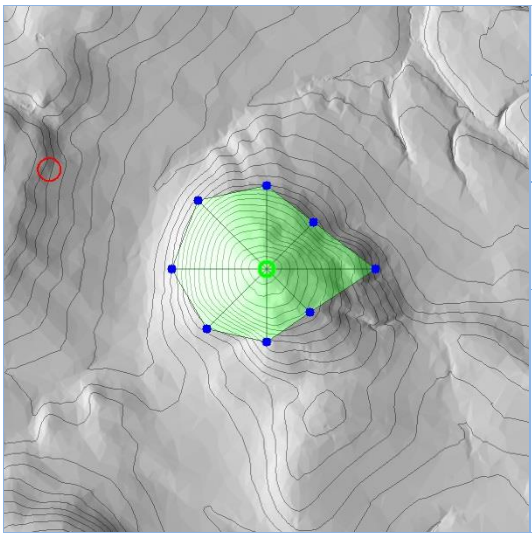


OE2 ***dūn***^{1}
[G3 ***dùn***^{2} (**An Dùn*) or Br3 ****dīnas***^{1} (**Dīnas*)]

**Dūnas* (Duns Law) DNS •R• NT 78473 54699 + Little Duns Law •R•NT 78347 55364

Duns [*original village site*] DNS •S• NT 78473 54699

OE *dūn*^{1i} 'consistently used in settlement-names for a low hill with a fairly level and fairly extensive summit which provided a good settlement-site in open country'.



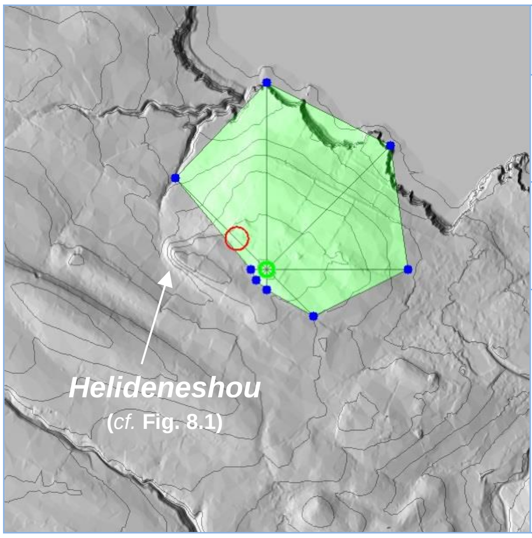
OE2 ***dūn***^{1}

Dirrington Great Law LMS •R• NT 69810 54911

Dirrington LMS •S• NT 68576 55479

OE *dūn*^{1ii} 'larger massifs with settlements at the foot of them'.

OE *dūn*^{1iii} 'an uninhabited hill adjacent to a settlement'.

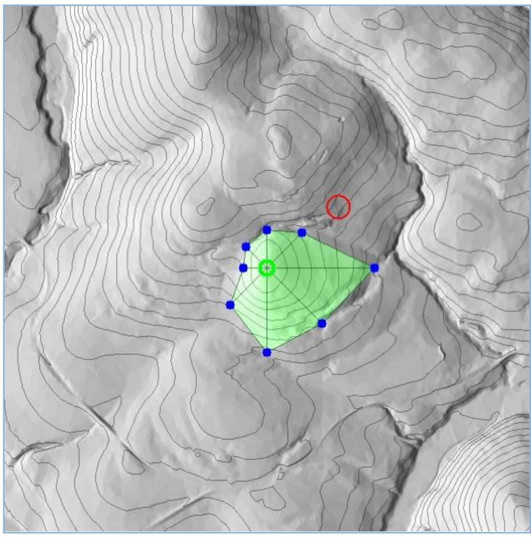


ESc2 ***doun***^{1}

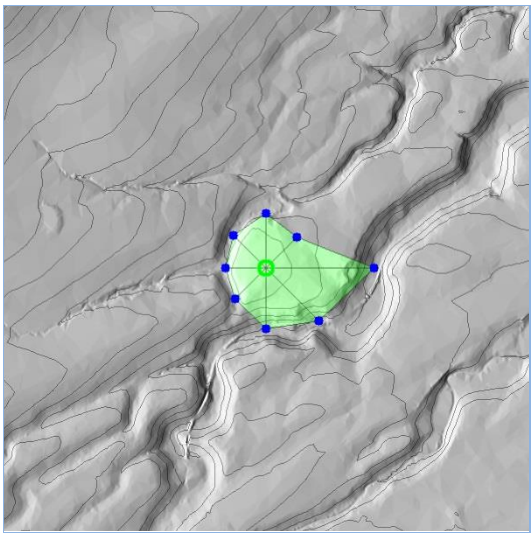
**Haly Doun* (> Hallydown) CHM •R• *NT 92587 64453

Hallydown$_{\{}$ (< **Haly Doun*) CHM •S• NT 92418 64628

ESc *doun*^{1i} 'consistently used in settlement-names for a low hill with a fairly level and fairly extensive summit which provided a good settlement-site in open country'.



Sc2 ***doun***^{1} or OE2 ***dūn***^{1} (**Snāwedūn*)
**Snaw Doun* (> Bonnet Plantation) LAU •R• *NT 55750 48486
Snawdon LAU •S• NT 56162 48833
Sc *doun*^{1} 'a hill, it may appear in place-names'. OE *dūn*^{1iii} 'an uninhabited hill adjacent to a settlement'.

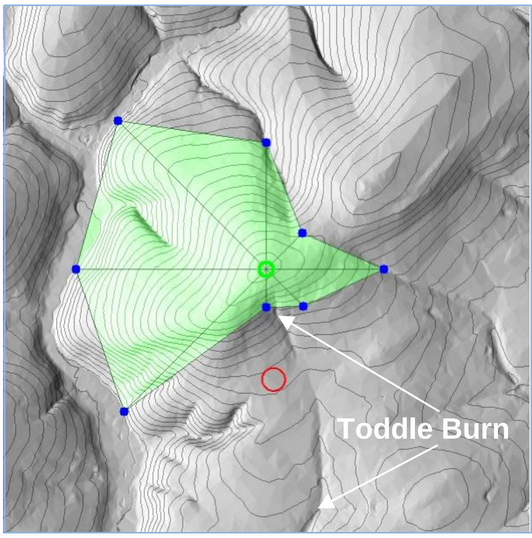


Sc3 ***doun***^{1} or OE3 ***dūn***^{1} (**Swar(d) dūn*)
**Swardoun* PWH (< Swardon Burn •W•) *NT 74266 48497
[Marchmont House, Redbraes Castle – §4.3.6.1]
Sc *doun*^{1} 'a hill, it may appear in place-names' OE *dūn*^{1i} 'consistently used in settlement-names for a low hill with a fairly level and fairly extensive summit which provided a good settlement-site in open country'.

Table 7.1. Toponymetric images for DOUN *cf*. Table 4.7.

It will be evident that DOUN and OE *dūn* refer to the same types of hill. A comparison of *Atlas* images for the toponyms listed in *Appendices I* and *J*, vs. *Appendix L* show this is equally true for the other test-pairings (§6.4.1–§6.5).

A final example of the role of human perception in the identification of relief-features, codified as sense definitions, is illustrated by a lost thirteenth-century name, *Todlaw*. Section 4.5.4 examined the available evidence and discussed the possibility Clints Hill CHK •R• NT 44152 53763, drained by the modern Toddle Burn CHK STO •W• NT 42909 50107, may have been the complement of the lost settlement.



ESc1 ***law***^{1}
**Tod Law* (?> Clints Hill) CHK •R• NT 44152 53763
Todlaw (?> Clints) CHK •S• NT 44194 53136
OE *law*^{1} 'a natural hill, sometimes a mountain'. 'a hill, a conical hill resembling a tumulus'. Sc *law*^{1} 'an isolated or conspicuous rounded or conical hill; frequently in place-names'. 'a hill, esp. one more or less round or conical'.

Table 7.2. Toponymetric image of ?*Tod Law CHK *cf.* Table 4.7.

The extensive landholding of Clints •S• being unattested before c. 1459, and Toddle Burn •W• perhaps derived from **Tod Law Burn*, as well as the suitable profile of Clints Hill •R• relative to Table 4.7, taken together are quite suggestive of this being the site of *Todlaw*. Although inconclusive in this particular instance, this application of toponymetry shows how such a tool might begin to contribute to future toponomastic research.

FUTURE RESEARCH

Chapter 8

8.0 Future Developments

> There is much scope for a 'Gelling and Cole' approach to be taken to the major topographic elements common to Welsh, Cornish, Breton, and the Brittonic of the Old North.
>
> *BLITON* i, 20.

The following six sections sketch a selection of projects by which the present research might be developed further.

8.1 Refining Toponymetry

Jasiewicz *et al.* 2014 illustrates one direction in which the geomorphon concept has evolved. This article describes an enhanced methodology that detects homogenous segments of terrain by comparing target areas (geomorphon-mapped grid-squares), with whole landscapes similarly encoded. A 'landscape search engine' identifies and compares landform patterns. This capability might be adapted to quantify relief-features comprised of multiple geomorphons rather than just the summit area used by the current version of toponymetry. The method promises to allow a more nuanced and fully automated classification of hills as types and so permit their physical properties to be compared by place-name elements across multiple languages. Ultimately, it may be possible to create an online toponymetric tool against which to compare known or lost place-names or conversely to measure how well a range of suspected hill-terms compares with a given section of landscape.

8.2 The Scottish Borders

An obvious continuation from having compiled a corpus of *NPSB* place-names (§3.2.2) would be to locate the relief-features cited for the other three counties (DMF, ROX, and SLK) and to apply toponymetry and statistical analysis to these. The intention would be to determine whether the findings for Berwickshire can be confirmed, but it might also reveal new insights as less common hill-terms from four contiguous counties might provide more numerically robust samples. This project would deliver a complete picture of non-Celtic hill-term distribution and quantification across the Scottish border area. Additionally, there is the potential for broader patterns to emerge, especially as one moves westwards into areas that add a tranche of Old Norse place-names to the mix.

8.3 Northumberland and County Durham

HPND offers an excellent dataset that could be reworked to create a complete profile of hills and hill-terms for analysis using toponymetry. Whereas Nurminen, quantifying hill parameters manually, was obliged to focus on representative groups of parishes, software-based computation would allow the entire study area to be examined and compared statistically with Berwickshire. This could fully respond to Nurminen's question of whether the same presentation of the GCH is detectable both sides of the Tweed (*HPND*, 317). Although some of the examples from *HPND* have already been analysed as part of the *LPN* corpus, it would be interesting to investigate whether differences emerge once the greater part of the Old Northumbrian dialect area has been subjected to an identical analysis.

8.4 Hill-terms in *LPN*

As with §8.2 and §8.3, this corpus is already assembled (§6.1–§6.1.3) and so profiling and statistically comparing those hill-terms without Berwickshire equivalents would be relatively straightforward. Also, as a result of *The Digital Exposure of English Place-Names* (DEEP) project, there is increasing availability of digitized material for much of England that could similarly be investigated. As *LPN* and *PNL* derive for the most part from a corpus established by *DEPN* (§2.2.1), it would be instructive to survey the relief-features of whole counties for the operation of the GCH and so perhaps discover what volume of material has hitherto remained unanalysed and if significant geographical variations emerge.

8.5 North-west Germanic

Unresolved questions of chronology and a possible continental origin for the GCH could only be satisfactorily addressed by a detailed examination of place-names on both sides of the North Sea. Toponymetry offers a new approach for comparing topographically matched sites to determine whether the GCH has operated in southern Denmark, northern Germany, and along the Frisian coastlands. Using terrain as the common denominator for comparison could support or refute Gelling's claim that the phenomenon originated in what would become England during the sub-Roman era.

8.6 Does the GCH operate in Celtic place-naming?

Finally, we return to James' suggestion (quoted at the opening of this chapter), but ask instead if language contact between Germanic and Celtic languages might be detectable in patterns of name-coining. For this, Scotland is perhaps uniquely blessed by having such a complex and dynamic linguistic history (§3.1.2.1). The published volumes of SSPN have begun to offer a rich repository of modern scholarship from which to mine hill-term data and so investigate possible degrees of specialization, incidence, and perhaps the direction of influences. A case-study creating a hill-term corpus from *PNFIF1-5*, *PNCLA*, and *PNKNR* would offer an interesting toponymetric contrast to Berwickshire as it could investigate place-names coined in Pictish and Gaelic alongside those of Scots and Old English. A further project with a similar objective might revisit Stuart-Murray's (2006) pioneering review of highland Perthshire hill-names – an area where Germanic influences are usually believed to be comparatively slight and of recent origin. Establishing that systematic place-naming is detectable in a region geographically remote from areas of Old English and Old Norse settlement would raise the question: is the GCH also a Celtic phenomenon?

Epilogue

Human perceptions of landscape provide the primary evidence for the Gelling-Cole Hypothesis as presented by its authors (*PNL*, 7–8; *LPN*, xiv). In conclusion then, Fig. 8.1 offers *Helideneshou* (§4.2.1.4; Table 7.1) as a Scottish example of $_{\text{OE}}$ *hōh* / $_{\text{ESc}}$ *huch* to compare visually with Gelling and Cole's own examples of Tysoe WAR and Ivinghoe BUC (Fig. 2.6). I believe Doreen Waugh's (2008, 414) reminiscence of Gelling identifying a similar hill <u>in Fife</u> would be just as appropriate in this Berwickshire instance: 'Margaret pointed an authoritative finger, quivering with excitement, at the part of the hill closest to the road and said, "A *hōh*, if ever I saw one!"'

Fig. 8.1. *Helideneshou* (Hallydown Hill CHM NT 92091 64510). A Berwickshire *hōh*?

[Fig. 2.6. Tysoe WAR (photograph: M. Gelling) Ivinghoe BUC (photograph: A. Cole)].

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Satellite Map Tiles © Esri – Source: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP, UPR-EGP, and the GIS User Community. (Map 1.1).

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