

Expanding the methodology of lexical examination in the investigation of the intersection of early agriculture and language dispersal

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Analysis of agricultural vocabulary remains one of the most compelling methodologies bearing on Renfrew's Farming/Language Dispersal Hypothesis, by which the reconstructed lexicon for a proto-language of a well-dispersed language family is predicted to contain several agricultural items. Mostly, though, this methodology has involved noting the presence or absence of particular lexical items for a given proto-language and drawing inferences from that, or working out root derivations and drawing appropriate inferences. I propose here two new types of lexically based argument, by way of expanding the methodology of lexical examination and analysis, looking first at derivational processes involved in the creation of relevant words and the meaning that such processes add to the derivative, and then at religious rituals and mythology to examine the embedding of agricultural vocabulary into the religious practices and mythological tales associated with early Indo-European culture. Ultimately, then, I argue that it is not enough to just look at the meanings of particular words and to try to develop a sense of what they originally meant, nor is it enough to determine the source of the words (derivation, etymology). Rather, one also has to look at how the words were used, what is reconstructible about the use and form of the word, and to look to the cultural context for the words. Only then can insights derived from lexical examination be used in developing a sense of prehistory.

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1. Introduction

Analysis of agricultural vocabulary remains one of the most compelling methodologies bearing on Renfrew's Farming/Language Dispersal Hypothesis, by which the reconstructed lexicon for a proto-language of a well-dispersed language family is predicted to contain several agricultural items. However, for the most part, this methodology has involved three different types of analysis. In one type, which can be called the "Proto-language Lexeme" approach, the presence or absence of particular lexical items for a given proto-language is noted, and appropriate inferences are drawn from that; in a second type of analysis, which can be called the "Root Etymology" approach, if root derivations for agriculturally relevant words can be worked out, then one can get a glimpse into the cultural mindset, so to speak, underlying the formation of a given item, as well as into the technology involved in such a derivation, thus undertaking a kind of "Wörter und Sachen" analysis; finally, in a third type, which can be called the "Loanword" approach, if borrowings can be detected that bear on agriculture, then one presumably has direct evidence for a particular kind of diffusion of agricultural knowledge.¹

These varied lexical methodologies are useful and have led to interesting insights over the years, but I suggest here that there are yet more ways to use lexical evidence. In particular, I propose two further types of lexically based argumentation, by way of expanding the methodological range of lexical examination and analysis that pertains to farming vocabulary and the inferences that may be derived from it.

First, though, it is useful to exemplify these types of analysis and offer a critique of them, so that the novel suggestions have a standard against which they can be compared.

2. Lexical analysis exemplified, and critiqued

In this section, I use material from the Indo-European family first to illustrate the various types of lexical analysis and then to provide the basis for a critical appraisal of the forms in question and of their value for deductions about agriculture among the Proto-Indo-Europeans, the speakers of the reconstructed Proto-Indo-European

1. Both the "Root Etymology" and the "Loanword" approaches could be considered subtypes of a general approach seeking the ultimate source of particular reconstructed proto-language lexemes.

language. In doing so, I give an assessment as well of the methodology involved, in a sense, then, first offering reconstruction and then offering deconstruction.²

2.1 The Proto-language Lexeme approach

For the first type of analysis, we can consider the following. There is an eminently reconstructible word for Proto-Indo-European for a farming tool, namely the plow, that has the form $*H_2erH_3-tro-m$ (with neuter nominative/accusative singular $*-m$), created from the root $*H_2erH_3-$ with the instrument-noun suffix $*-tro-$. This reconstruction is indicated by the cognate set of Greek ἄροτρον (*arotron*), Old Irish *arathar*, Armenian *arawr* (< $*arā-tro-$), and Latin *arātrum*; relevant here too are forms with well-instantiated variants of the $*-tro-$ suffix, namely Lithuanian *árklas*, with $-kl-$ from $*-tl-$, and the Slavic forms with the $*-d^hlo-$ variant found regularly in Slavic, such as Serbian *rǎlo* and Czech *rádlo*, from Proto-Slavic $*ordlo$ (from $*H_2erH_3-d^hlo-$). The root might well mean ‘to plow’, so that the derived word would be ‘the instrument through which plowing takes place’, but given that the root is the basis for the Hittite word for ‘rake’ (discussed below, in § 3), the original meaning may have been ‘to break ground’ (as Tischler 1983: 122 suggests).

Moreover, with the same instrumental suffix, one finds evidence for another agricultural tool, specifically one that is grain-related, in various cognate words for ‘sieve’, an implement used in harvesting grains: Old Irish *criathar* ‘sieve’ from (full-grade) $*krei-trom$, where the root is $*krei-$ ‘select’, and Old English *hridder* (with a secondary variant *hriddel*) from a zero-grade ($*kri-tro-$); relevant here too is Latin *cribrum* ‘sieve’, from the same root but with a variant form of the $*tro-$ suffix,

2. I work with a somewhat traditional but, I believe, widely accepted phonological system for Proto-Indo-European; see Fortson (2010: 53–74), for this view and an explication of the motivation for it. The symbol <ǵ> indicates a stop at the palatal point of articulation, so that <ǵ> is a voiced unaspirated palatal stop. <H> stands for a laryngeal consonant, one of three such sounds reconstructed for Proto-Indo-European, the phonetics of which are somewhat unclear (but are certainly not “laryngeal” consonants phonetically; I use <H₁> for the laryngeal that has no vowel-coloring effect on an adjacent $*e$, <H₂> for the laryngeal that colors an adjacent $*e$ to [a], <H₃> for the laryngeal that colors an adjacent $*e$ to [o], and <H> for a laryngeal whose vowel-coloring properties are indeterminate. All other phonetic symbols have their usual interpretation. I use the terms “full-grade” and “zero-grade” to refer to different ablaut grades of Proto-Indo-European roots and suffixes, the former referring to root forms that have the vowel $*e$ and the latter referring to root forms lacking the full-grade vowel $*e$. I give Greek forms in Greek letters with a transliteration following in parentheses.

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specifically from **krei-d^hrom*. In each case, the meaning of the derivative would be ‘the instrument through which a certain kind of selection takes place’.³

The reconstructibility of a word for ‘plow’ can be taken as *prima facie* evidence supporting the hypothesis that the Proto-Indo-European community had a knowledge of cultivation and agriculture; moreover, a reconstructible word for ‘sieve’ would focus attention on grain-related farming.⁴ Indeed, a number of words for grains can be reconstructed for Proto-Indo-European; Kölligan 2017 gives the following summary:⁵

The PIE people were agricultors as can be seen in inherited terms for ‘grain’ such as **ǵr̥h₂-no-* ..., orig. ‘ground’, a verbal adjective built to the root **ǵerh₂-* ‘grind’ (that might be identical with **ǵerh₂-* ‘make/get old, wear down’ ...), **ieuo-* ‘corn, barley, spelt’ ..., **puHro-* ‘wheat’ ... (perhaps from **peuH-* ‘purify’, Skt. *punāti, pāvate*, i.e. that which is purified on the threshing floor), and **d^hoh₁neh₂-* ‘corn, seed’ ... (perhaps from **d^heh₁-* ‘put’ [sc. into the ground]). Also attested, though with more limited distribution, are **urug^hio-* ‘rye’ ... and **b^har-es-* ‘barley’

Still, there are potential issues that prevent one from wholeheartedly endorsing these results. Most significantly, the **-tro-* suffix (with variants, as in Slavic) is well represented across the various branches of Indo-European and can be considered to be somewhat productive (Meillet 1964: 273). As such, it could be used to form an instrument noun at any time and could therefore presumably have been created in individual branches. Moreover, if the original meaning of **H₂erH₃-* were ‘to break ground’, then ‘plow’ could be a specialization of a noun meaning ‘the instrument through which breaking of ground takes place’. This raises the possibility that even though it is attested in several distinct points within Indo-European, both east (Slavic, Armenian) and west (Latin, Irish), the ‘plow’ meaning for this word could represent the result of independent semantic shifting within each point.⁶ Such considerations would mean that, strictly speaking, **H₂erH₃-tro-m* need not have been a part of Proto-Indo-European proper. Similarly, since the words for ‘sieve’ occur

3. The apparently metaphorical use of *sift* or *winnow* in English today, as in *to sift through / winnow the application files for the best candidate*, attests to the closeness of selection in general and selecting the most suitable grains via physical sifting.

4. See below, however, for a reconsideration of the basic root for the ‘plow’ word and its derivation, and also some discussion of ‘sieve’ in Hittite and elsewhere.

5. See also Mallory & Adams (1997: 51–2 (S.V. BARLEY), 236–7 (S.V. GRAIN), 409 (S.V. OATS), 491–2 (S.V. RYE)).

6. Moreover, if Armenian and Greek are developments from a deeper “Helleno-Armenian” dialect within Indo-European and Italic and Celtic share a deeper “Italo-Celtic” connection, the number of distinct points is reduced.

in the areally close Italic, Celtic (or Italo-Celtic, see footnote 6), and Germanic, one might suppose that they belong to a western Indo-European grouping, not necessarily representing a common innovation so much as possibly showing diffusion from one branch to another; in that case, it too would not necessarily be reconstructible for Proto-Indo-European itself. The same can be said for some of the grain-words that Kölligan reconstructs, especially those with a “more limited distribution”, such as ‘rye’ and ‘barley’ (though see § 3 for more on ‘barley’).

It must be admitted, though, that given their respective distributions, ‘plow’ would seem to have a better chance of being of Proto-Indo-European age than ‘sieve’. And one can easily suppose that the meaning of the root $*H_2erH_3-$ was specialized to ‘to plow’ in Proto-Indo-European times. Since it is hard to imagine that there was a verb meaning ‘to plow’ without the primary instrument for effecting the action of that verb, $*H_2erH_3-tro-m$ as a Proto-Indo-European word for ‘plow’ becomes a more compelling reconstruction. Nonetheless, the more general methodological caveat here is that positing specific words as members of a proto-language lexicon is fraught with difficulty, so that drawing inferences about cultural or technological history from the presence or absence of particular lexical items is equally fraught.

2.2 The root etymology approach

As for the second type of analysis, Kölligan’s assessment contains some speculation about the roots involved in nouns for grains. It should be noted, though, that if the grain-words represent derivatives of roots that have nothing to do with agriculture, e.g. ‘wear down’, ‘purify’, ‘put’, it could be that the specialization of their meanings to grain-related senses was a later phenomenon that occurred either post-Proto-Indo-European after the dispersal of the individual branches, or at a late stage within the proto-language.

A somewhat more complicated case that presents a wide range of caveats even in the face of a seemingly strong representation across the family and a clear root derivation is that of the word for ‘field’. A careful consideration of the issues it raises is important, however, for the methodological lessons to be learned from it.

Based on the equation offered by words for ‘(arable) field’ in various languages, specifically Latin *ager*, Greek ἀγρός (*agrós*), Sanskrit *ajra-*, and Gothic *akrs*, a reconstructible word for Proto-Indo-European, $*H_2eǵ-ro-$, with the meaning ‘(arable) field’, appears to be well called for. At this point this exercise appears to be like the proto-language lexeme approach discussed in § 2.1, with the reasoning being that if the Proto-Indo-European speech community had a word with such semantics, then arability of a field must have been a relevant notion for the Proto-Indo-Europeans,

and consequently the tools for making fields arable would also have been available to them.

However, one can go further, as this word appears clearly to be derived within Proto-Indo-European from a root $*H_2eǵ-$ – a derivation evident in each language too, cf. Latin *agō*, Greek ἄγω (*agō*), Sanskrit *ajā(mi)*, Old Norse *aka* – a root that means ‘to drive, to lead’ in the individual languages. Assuming – as one would in the “root etymology approach” – that this meaning is valid for Proto-Indo-European would indicate that the derivative probably originally meant ‘driving-place, i.e. place where animals are driven’,⁷ as in plowing; this derivation would thus suggest established agricultural practices for the proto-language whereby this noun could be associated with this meaning of the verbal root.⁸

What makes it complicated is that all aspects of the derivation raise concerns; it is thus a particularly important lexical item to consider from a methodological standpoint. For instance, in Vedic Sanskrit, the earliest Sanskrit available,⁹ *ajra-* means ‘plain’ or ‘grassy field’, as contrasted with mountains (cf. Masica 1979 on this, drawing on Brandenstein). That detail could indicate that the meaning ‘arable field’ represents a later semantic shift, and therefore it is not to be reconstructed for Proto-Indo-European, despite the match across the languages. Indeed, traces of that presumed original meaning are found in derivatives in other languages, especially Greek ἄγριος (*ágrios*), ‘wild’ (i.e., “of the field”), which is matched exactly in form, and closely in meaning, by Vedic Sanskrit *ajriya-* ‘being in or connected with a field or plain’ (Monier-Williams 1899: s.v. *ajrya-*).

However, if $*H_2eǵ-ro-$ is a derivative from $*H_2eǵ-$ ‘to drive’, as one looking for evidence of agriculture in Proto-Indo-European society might posit, it is fair to ask how $*H_2eǵ-ro-$ could have at first had the meaning ‘grassy field, plain’. A semantic shift from something like “driving place” to “grassy field” does not seem particularly reasonable or well motivated.

A possible solution here might be to consider both meanings to be reconstructible for Proto-Indo-European, but at different chronological layers of Proto-Indo-European. This is especially feasible if we assume that what we call “Proto-Indo-European” actually represents a speech community that existed over

7. As Pokorny (1959: 6) puts it, “Ort, wo das Vieh hinausgetreiben wird”.

8. In a sense, the discussion concerning the derivation of the noun ‘plow’ from the verbal root ‘to plow’ in § 2.1 overlaps with this “root etymology approach”, except that with ‘plow’, the semantics of the verbal root made for a more obvious connection to the noun than with ‘field’ and ‘to drive’.

9. Vedic Sanskrit refers to the Sanskrit as found in the hymns of the Rigveda and related materials. The Rigveda is conventionally dated to about 1200 BC, though parts are clearly much older, showing cognate phraseology – not just words but full phrases but even thematic parallels – in other ancient Indo-European material, such as Homeric Greek or Hittite rituals.

a long time span and thus that semantic shift could have taken place in the course of what we still label as Proto-Indo-European. This is a distinct possibility, to be sure, but is essentially untestable. Moreover, the original impetus for the semantic derivation and the putative connection with the root $*H_2eg-$ in the meaning ‘to drive’ and subsequent semantic shifts would remain to be explained. Typological lexical semantics, the exploration of what sorts of semantic shifts are attested and are plausible and thus waiting to be invoked as parallels to a putative shift in reconstructed items or in derivatives, can be of assistance here, though nothing relevant immediately suggests itself here.

While such issues may suggest that the agricultural meaning is original after all, it could also mean that the derivation from $*H_2eg-$ ‘to drive’ needs to be reconsidered. And, indeed, from a formal standpoint, quite apart from the semantics, the derivation of $*H_2eg-ro-$ from $*H_2eg-$ ‘to drive’ is somewhat problematic. In particular, the suffix $*-ro-$ usually created adjectives, not nouns, and usually had zero-grade of the root it attached to (Meillet 1964: 267), as shown by such forms as Avestan *tiy-ra-* ‘sharp’ (root $*(s)teig-$ ‘to stick, to be sharp’), and Vedic Sanskrit *ugrá-* ‘powerful, fierce’ (root $*H_2eug-$ ‘to increase’), *ṛj-rá-* ‘shining’, among others, this last with an exact cognate in Greek *ἀργός* (*argós*) ‘bright’ (from a presumed $*ἀργρός$ ($*argrós$)). While it is hard to see what other derivation for $*H_2egro-$ might be possible,¹⁰ the fact of a problematic derivation coupled with the semantic issues must give one pause in drawing too solid an inference about Proto-Indo-European agriculture from $*H_2egro-$, and thus more generally, from placing too much store in deriving cultural information from root etymologies. As seen in § 2.1, a shaky linguistic foundation for a cultural inference means that the inference itself is diminished in value.

2.3 The loanword approach

The loanword approach seeks to identify borrowings in the proto-language that allow for inferences about, in this case, agriculture and related matters. As such, it has a more direct cultural basis, as the borrowing of lexical items implies contact between speakers of different languages, and thus of different social groups.

By way of illustrating this approach, one can cite the word for ‘a kind of harmful insect’, reconstructed for Proto-Indo-European as $*math-$ by Pokorny (1959: 700) on

10. Romain Garnier (p.c., September 2016), noting the unusual *e*-grade, speculated that perhaps one should reckon with a different root and a different segmentation altogether for $*H_2egro-$. For instance, if $*H_2egro-$ were segmented $*H_2e-ǵr-o-$, one might suppose it is composed of a preverb $*H_2e$ and a root $*ǵer-$; however, no known Proto-Indo-European preverb has that shape and no known Proto-Indo-European root has a reasonable semantic fit here.

the basis of the apparent cognate forms Armenian *mat'il* 'louse' and Gothic *maþa* 'moth', with a host of inner-Germanic cognates, including Old Icelandic *maþkr*, Old Swedish *matk*, and English *moth*. This reconstructed form word is phonologically unusual for Proto-Indo-European in two respects: the occurrence of a voiceless aspirate,¹¹ and the occurrence of **a*, a vowel which is rejected altogether for Proto-Indo-European by some Indo-Europeanists (see, e.g., Beekes 1995: 138–9) or recognized as occurring mainly in words that are marked in some way, e.g., as described by Meillet (1964: 99), "mots de caractère populaire, technique ou affectif". Beekes (ibid.) suggests also that words with **a* might be very old loans, a reasonable view inasmuch as phonological oddities are often associated with loan words. Thus, this word may well have been a borrowing into Proto-Indo-European; in this regard, Finnish *matikka* 'little worm' is relevant, as it is an apparent loanword from Swedish (as suggested by Pokorny) and thus shows that this is the sort of word that can be borrowed. Moreover, and more to the point for the discussion here, while there are many types of moths and harmful insects, particularly common among moths are those that attack grains, such as the Indian mealmoth (*plodia interpunctella*) and the Angoumois grain moth.¹² The argument here is that from some external source, Proto-Indo-European itself (as opposed to Armenian and Germanic independently) acquired this loanword designating an agricultural pest, which would suggest that Proto-Indo-European society had the sort of agriculture that would attract such pests. While it is of course a bit of speculation that the relevant pests were grain moths, associating this loanword with agriculture would provide a motivation for the borrowing, which otherwise would just be a random event.

A more specifically grain-related Proto-Indo-European lexeme that has been considered to be a borrowing is **b^har(e)s-* 'barley'. As Mallory and Adams (1997: 51) put it, "This word is found in the west and center of the IE world and is often taken to be a borrowing". They go on to mention Proto-Semitic **burr-/barr-* 'grain, threshed grain' as a possible source, though they note (ibid.) that "the distribution of cognates within Indo-European does not support direct connections with the Near East". As an alternative, they state that it could be a substratum word of "central or

11. The prevailing view about the Proto-Indo-European phonological system is that it did not have phonemic voiceless aspirated stops (see Fortson 2010: 56), though there are a few cognate sets that are suggestive of the need for reconstructing such sounds. See Joseph 1985 for some relevant discussion as well, especially pertaining to this word for 'moth'.

12. As a rule, I consider it bad form to cite Wikipedia as a source for anything linguistic, but I am out of my element when it comes to the entomological (as opposed to the etymological) side of moths, and have found the material and the links provided by relevant Wikipedia pages to be very helpful, e.g. <<https://entomology.ca.uky.edu/ef156> and https://en.wikipedia.org/wiki/Indian_mealmoth>. Put each separate URL in angle brackets, so that they read "...ef156> and <https: ..."

western Europe”, but if so, they suggest, “it is a very old borrowing, taken across at a time when the various Indo-European dialects were not very much differentiated” (ibid.). If a borrowing, and if the source can be identified, then inferences can be drawn about agriculture and early Indo-European societies, but there is not necessarily great clarity here as to which of these hypotheses is correct.

Thus, there are several assumptions needed to make such borrowing-based inferences work, especially involving the identification of the ultimate sources of the loanwords and their original meaning. Such assumptions, if too many, might well prove ultimately to undermine the value of looking to loanwords for inferences about cultural diffusion. Thus loanword analysis, like the other types of lexical analysis surveyed in § 2.1 and § 2.2, is only as strong as the linguistic foundation it is built on.

2.4 Assessment

The upshot of this survey of various kinds of lexical analysis is that as potentially useful as these typical types of analysis are, other methods are needed to supplement them. While some such “other methods” might be envisioned that are of a nonlinguistic nature, lexical analysis offers yet other dimensions that can be exploited that are linguistic in nature. In the sections that follow, I present, discuss, and highlight further types of lexically based methods of analysis that illustrate other means of developing insights into a proto-language from an examination of proto-language lexical material.

3. Derivation

As the example involving ‘field’ (Greek ἀγρός, etc.) showed, examining the internal source of a word can potentially offer some insight into the reconstructed proto-lexicon, even if that particular example had some issues. Still, we can draw a distinction between determining the etymology of a word – identifying the root that underlies it – and studying the details of its derivation. That is, understanding a given item’s word-formation details, that is, looking at the precise derivational processes involved, can be helpful in developing a picture of the proto-language lexical stock. For instance, Latin *rāstrum* ‘drag-hoe’ derives from the verb *rādō* ‘scrape’ with the aforementioned **-tro-* suffix, but there is reason to believe that that suffix was “moribund in Latin” (Weiss 2009: 283), suggesting that this noun is an old form whose derivation can be projected back into Proto-Indo-European, or at least pre-Latin, despite its relative isolation within Indo-European.

Similarly, the noun **yugom* ‘yoke’, derived from **yeug-* ‘to yoke, to join’, is used in reference to yoking oxen to a plow, with widespread cognates across the family, including Sanskrit *yugam*, Hittite *iukan*, Greek ζυγόν (*zugón*), Lat. *iugum*, English *yoke*, Old Welsh *iou*. As a derivative, it would appear that **yugom* must be very old, as derivationally, it involves the formation of a thematic noun from a verbal root (**yeug-*, cf. Skt *yuj-*, Greek ζεύγ- (*zeúg-*), Latin *iung-*) by internal derivation – with zero-grade ablaut – and with no specialized suffix beyond the thematic vowel **-o-*.¹³ Indeed, Mallory and Adams (1997: 655) include this noun as among the reconstructible Proto-Indo-European agricultural terminology, as does Kölligan 2017. However, even if to be posited as part of the Proto-Indo-European lexicon on the basis of its derivational pattern, the original sense could have been for yoking a team to a chariot, as suggested by Vedic Sanskrit terminology, and not for yoking a team to a plow.

Nonetheless, the methodological step of looking to the details of derivation and the processes involved – more a matter of Proto-Indo-European word-formation per se than just (root) etymology – shows promise as a type of lexical analysis, if the right words and the right manner of derivation are summoned forth. I offer here such a case in point, involving a Proto-Indo-European derivational process, namely reduplication, due to its possible involvement in terms for various items of agricultural relevance.

Drawing here on Joseph (1992), I suggest that reduplication as a morphological process employed in word-formation in Proto-Indo-European lies at the intersection of various Indo-European words for grain and for instruments, especially agricultural instruments. Such a nexus allows for the hypothesis that reduplication was specialized for use in Proto-Indo-European with agricultural terminology.

The relevant evidence comes out of a consideration of Hittite *memal* ‘grits, meal’ and Armenian *mamul* meaning ‘press, vice’. Both forms are built on the root **melH₂-* for ‘to mill, to grind’ (Rix & Kümmel 2001: s.v., ‘zerreiben, mahlen’), seen in Hittite *malli*, Latin *molō*, Old Irish *melid*, inter alia. Both show reduplication in their derivation, but they have different functions, different kinds of meaning related to milling. In particular, *memal* is a result noun, in particular referring to grain – grits or meal taken as the results of milling – whereas *mamul* is an instrument noun, a related kind of machine or tool.

Reduplication occurs across the Indo-European family in grain-related words and in Hittite and maybe elsewhere on several grain/agriculture-related instrument nouns. Regarding the former, grain-related words, there are the following to take note of:

13. The thematic vowel itself could well have had a semantic function in derivation but it more usually serves just a classificatory function as an indicator of a particular pattern of inflection.

1. Greek παιπάλη (*paipálē*) ‘finest meal’, with variant πασπάλη (*paspálē*),¹⁴ all of which are related within Greek to (derived from) πάλλω (*pállō*) / παιπάλλω (*paipállō*) ‘to quiver, to shake’,¹⁵ from the Proto-Indo-European root **pel(H)-* ‘to pour, to flow, to fill’.
2. Latin *furfur* ‘bran’, from a Proto-Indo-European root **gher-* ‘rub’, seen in Lithuanian *gūrti* ‘crumble’, and in the initial cluster of English *grind*.
3. Sanskrit *kiknasa-* ‘particles of ground corn’, most likely from a Proto-Indo-European root **knes-* ‘scratch’, an enlargement of **ken-*, as found in Greek κνέωρος (*knéōros*) ‘spurge-flax’; a possibly relevant form *isikkasa-* ‘barley meal’, which appears to show reduplication, though its base root is uncertain.

Regarding the latter, instrument words, the following can be cited:

1. Armenian *mamul* ‘press, vice’, related within Armenian to the verbs *malem* ‘to smash, to crumble, to chop’ and *mlmlem* ‘to rub’, and the noun *mul-* ‘mill’, and outside Armenian to Old High German *muljan* ‘to smash, to crumble’, and Greek μύλη (*múlē*) ‘mill’ all from a Proto-Indo-European root **melH₂-* ‘to grind, to mill’ (and see above regarding *memal*).
2. Hittite ^{GIŠ}*šešarul*¹⁶ ‘sieve’ (with a related verb *šešarie-* ‘to sift’) < PIE **srew-* ‘to flow’ (an enlarged form of **ser-* ‘to flow’), with a ‘sieve’ representing the instrument through which a certain type of flowing, e.g. of grain, is accomplished.
3. Hittite ^{GIŠ}*hah(ha)r(a)-* ‘rake’ (with derived denominal verb *hahharie-* ‘to rake’) < **H₂erH₃-* ‘to plow, to break ground’ (so Tischler 1983: 122).

It may also be the case that the celebrated Proto-Indo-European word for ‘wheel’, **k^we-k^wl-o-*, belongs here too. Its reconstruction is guaranteed by the equation of Sanskrit *cakra-*, Greek κύκλος (*kúklos*), and Old English *hweo(wo)l*, and it derives from the root **k^wel-* ‘turn’. This noun can embody an instrument function, with a wheel being something by which turning is accomplished, perhaps originally ‘the turner’, as far as its meaning is concerned. Its Proto-Indo-European age is suggested also by the fact that it has an apparently archaic structure, with reduplication and

14. Greek also shows a synonymous nonreduplicated form πάλη (*pálē*).

15. This verb admittedly shows reduplication, but the reduplication here presumably reflects another cross-linguistically common function for this process, namely intermittent action.

16. The superscript element “GIŠ” in this word and the next, here and throughout, indicates a Sumerian cuneiform logographic symbol (meaning ‘wood’, literally) that is used as a determiner of a class of noun, in this case instruments made with wood; the noun itself here is written out syllabically in Hittite (e.g., as *šešarul*). Such “Sumerograms” are frequent with certain words and are typically cited, as here, as part of the Hittite representation of the word even though they have no phonological relevance.

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zero-grade, traits that individually but especially together are somewhat uncommon among Indo-European nominal forms. As an instrument, the wheel was surely materially involved in agriculture, as it provided the possibility of carts and wagons to haul the results of harvesting grain and other crops, as well as manure to be used as fertilizer.¹⁷

All that is seen here for the semantics and function of these reduplicated terms across Indo-European is consistent with cross-linguistic uses of reduplication, going with nouns for items taken in collectivity in many little bits and pieces, like grains, and for repeated actions (cf. Moravcsik 1978), so that the possibility of independent use of reduplication in each linguistic tradition cannot be dismissed. However, it can be speculated that reduplication is perhaps especially well suited as a derivational process with agricultural terms, since the actions involved in agriculture, including tilling, plowing, and sifting, require repeated actions in ways that the tasks involved in, say, animal husbandry, do not, and the results of agriculture, especially involving grains, lead to collections of multiple small items. If this is so, then we can say that even though **k^we-k^wl-o-* is not found in Anatolian ('wheel' is *hurki-*), the Proto-Indo-European agricultural instrument derivational process is present nonetheless via ^{GIS}*šešarul* 'sieve' and ^{GIS}*hah(ha)r(a)-* 'rake'.

It must be admitted, of course, that reduplication as a process has other functions in Proto-Indo-European, most notably the grammatical functions of being one of the distinctive marks of the perfect tense, as seen (with the reduplicative syllables in bold), e.g., in the equation of Greek λέ-λοιπ-ε (*lé-loip-e*) 's/he has left', Sanskrit *ri-rec-a*, from **le-loik^w-e*, and of being a key element in some present tense formations, as seen (ditto), e.g., in the equation of Greek δι-δω-σι (*dí-dō-si*) 's/he gives', Sanskrit *da-dā-ti*.¹⁸ And, it figures in the more lexical derivation of intensive stems, to judge from Sanskrit forms such as *jān-ghan-ti* 'he strikes repeatedly' (root *han-* from **g^when-* 'to strike') and parallel Greek forms like παμ-φαίν-ει (*pam-pháin-ei*) 'it shines forth' (root φαν- (*phan-*) built on **bheH₂-* 'to shine'). Moreover, it is true as well that reduplication does not occur in all agricultural terms; indeed, some of the reconstructible words for grains and tools already discussed, e.g. **ieuo-* 'corn, barley, spelt' or **H₂erH₃tro-* 'plow' show no reduplication. Nonetheless, the clustering of reduplication in various terms for grain and instrumentation for grain and agricultural across the family is striking, and would go unnoticed without the

17. The wheel can of course be used in grinding grain but unfortunately there is no archaeological evidence suggesting that the Indo-Europeans used wheels in that way; that particular use seems to have been an invention in Hellenistic Greek times.

18. The difference in the reduplicative vowel – *a* in Sanskrit versus *i* in Greek – while a real issue to be tackled in reconstructing the details of present-stem reduplication, is irrelevant for the equatability of the stem-formation type.

impetus provided by lexical analysis of derivational patterns and their possible relation to a specific semantic class of words. The argument, then, from this observation, for agriculture in Proto-Indo-European would be that the specialization of a derivational process for use with agriculturally related terminology would only be possible in a society in which there was agriculture; that is, one needs to have the technology first within a society for there to be a derivational process specialized for vocabulary associated with that technology.

4. The lexicon of ritual

A further type of lexical analysis looks at the use of particular agricultural words in context. In particular, the language of Proto-Indo-European religious rituals and mythology gives evidence in them, as argued by Watkins (1978) in his discussion of “famous grains” of Proto-Indo-European, of the embedding of agricultural vocabulary into the religious practices and mythological tales associated with early Indo-European culture. This usage can be taken to demonstrate how ingrained (so to speak!) the practice of agriculture must have been for the Indo-Europeans if it is able to penetrate into their holiest and most sacred practices.

In particular, Watkins draws attention to a number of ways in which grains figure in references to rituals and myths associated with rituals in early Indo-European texts, especially Homeric Greek epic, the sacred Sanskrit hymns of the Rigveda (RV) and Atharvaveda (AV), and passages in the ancient Iranian language Avestan. I give here a sampling of the remarkable collection of relevant material that Watkins assembles in support of his hypothesis of the prominence of grains in Proto-Indo-European religious culture.

For instance, Watkins (1978: 10–14) notes what he refers to as “the solemn utterance ἄλφι καὶ ὕδωρ [(*álphi kai húdōr*)] ‘barley and water’ of the goddess of grain herself, in the Homeric Hymn to Demeter 208”.¹⁹ And, in the Atharvaveda, hymn 6.14, “*yáva* ‘barley’ is the addressee of a hymn” and is referred to as *devam* ‘divine’.²⁰ Watkins observes, concerning that hymn, that “agricultural *carmina* such as AV 6.14 are deeply rooted in the Indo-European tradition”. He further states that the combination of *yava-*, and its Avestan cognate counterpart *yauuō*, with the verb *karš-* ‘plow’, Avestan *karš-*, is a Common Indo-Iranian verb phrase, and its occurrence in “an important passage in the Vīdēvdāt ... shows the religiosity

19. Greek ἄλφι (*álphi*) is cognate with Albanian *elb* ‘barley’ and some modern Iranian forms, e.g. Pashto *ōrbaše* (PL.) ‘barley’ (Mallory & Adams 1997: 51).

20. Sanskrit *yava-* is cognate with Greek ζεῖαι (*zeiai*), Hittite *euwan*, Tocharian B *yap*.

of the cognate *yaauō* in Iranian”.²¹ He goes on to develop a line of argumentation showing that “not only has barley a genealogy, but also a mythology”. Among the myths associated with barley is that in RV 1.117.21 in which *yava-* is said to be spread by “the two Ásvins ploughing and sowing *with a wolf*” (so also RV 8.22.6); other animals are mentioned in connection with sowing barley in other passages: the bull (*vṛṣan-*), in RV 1.176.2, and cattle (*gav-*), in RV 1.23.15. Watkins elaborates on the role of grain, saying that “in the Indo-Iranian world barley has its place not only as a foodstuff, and not only in the cosmology and mythology, but also in cultic practice”. One finds the ritualistic mixing of barley with milk, a product of related agricultural practice, in both Indic and Iranian sources, and “roasted barleycorns ... are eaten by Indra as a *garnish* to the soma drink itself” as a part of the soma ritual. Importantly, Watkins finds parallel practices and phraseology to the grain-related aspects of the soma ritual in Homeric passages, e.g. in book 10 of the *Odyssey* (especially lines 233–236 and 316), where there is “the description of Circe’s magic potion that turns men into swine”. Finally, there is parallel in the mixing of barley and water (the ἄλφι καὶ ὕδωρ (*álphi kai húdōr*) cited above) in the Homeric Hymn to Demeter, about which Watkins opines: “There can be no doubt that we have an extremely archaic piece of traditional lore, both linguistically and thematically”. In summation, taking in parallels not discussed here, Watkins (1978: 17) offers the following particularly compelling statement:

My conclusion is dictated by the basic tenets of the comparative method: the soma ritual of Vedic and Indo-Iranian, by men for men, but symbolically by women; the ritual act of communion of the Eleusinian mysteries, by women for women; and a warrior ritual in archaic Greece, by women for men; all of these must go back to a single common Indo-European liturgical cultic practice. The number and the precision of the agreements between Indo-Iranian and Greek, and their articulation as a structure, a *total social fact*, are too striking for a fortuitous resemblance to be plausible.

The fact that grains and other agriculturally related entities are embedded in these cultic practices and religious rituals raises the question, hinted at in the beginning of this section, of how this mytho-religio-linguistic embedding could have occurred, that is, how such items – the lexemes and the real-world entities that they represent – could have become such an important part of this cultural context. The answer seems clear: it could only have happened if grains were a part of Proto-Indo-European culture already in the reconstructed proto-language, the language ancestral to Anatolian as well as Greek, and Italic, that is, “classical” Proto-Indo-European

21. The *Vidēvdāt* is a subpart of the Avestan corpus that deals with ways of counteracting evil demons.

(or Proto-Indo-Hittite, so to speak), and if they were a key part of life for the Indo-European speech community. The specificity of the parallels that Watkins notes, both as to practice and as to diction, is what – according to the dictates of the comparative method – allows one to locate grains chronologically in Proto-Indo-European society; it is difficult to suppose that such precise correspondences could have arisen independently in each branch. The examination of the context in which the relevant lexemes occur, then, in reconstructible Proto-Indo-European text and practice thus becomes a tool for learning about prehistoric agriculture as far as the Indo-Europeans were concerned.

5. Conclusion

Ultimately, then, my claim is that it is not enough to just look at the semantics of particular words and to try to develop a sense of what they originally meant (this type of grain or that, this type of fruit or that, etc.), nor is it enough to determine the source of the words (derivation, etymology, including borrowing). Rather, one also has to look at how the words were used, what details are reconstructible about the words, including the derivational processes involved in their formation, and the use of the words, including the cultural context in which they occur. If we are armed with such a fuller perspective, then the insights we derive from lexical examination that are used in developing a sense of prehistory can take on a greater degree of credibility.

It is important to realize that the extensions of previous lexically based methodologies advocated here may not be applicable in all cases or in all language families. With Indo-European, we are blessed with an abundance of ancient testimony to work with, and thus we can milk that material for all it is worth, so to speak. However, since part of the argumentation here comes from mythological and ritualistic uses of particular language, even cultures without a deep written history could have a deep oral tradition to draw on.²² The dimensions to lexical analysis discussed here, therefore, represent ways of getting more out of this material than a focus simply on vocabulary inspection or root derivations or etymology would allow.

22. In this regard, it is instructive to remember that although there is now a written tradition for the transmission of the Vedic hymns, for millennia they were – and still are, even now with written forms to work with – passed down orally.

Abbreviations

AV	Atharvaveda
(P)IE	(Proto)-Indo-European
RV	Rigveda

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