The Latin prefix *sesqui-* makes an occasional appearance in English in compound adjectives such as ‘sesquicentenary’ and ‘sesquimillenary’. In these its function is to multiply by $1\frac{1}{2}$, so that sesquicentenary makes reference to the number 150 and sesquimillenary to 1500.

The same prefix appears in English in an even more obscure set of adjectives denoting what is called a superparticular\(^1\) ratio: the ratio of any number to the one above it (3:4, 5:6, 18:19 etc.). These adjectives are of the form ‘sesquitertia’ (which refers to the ratio 3:4), and in them the prefix *sesqui-*, whatever its function is, clearly does not multiply by $1\frac{1}{2}$.

The purpose of this article is to examine the use of *sesqui-* in classical Latin and so establish the relationship between the two functions which it still possesses.

### A. *Sesqui-* = $1\frac{1}{2}$ times

The Latin prefix *sesqui-* is a contraction of *semisque* ‘and a half’. It appears in Latin in compound nouns such as *sesquiliba*\(^2\) ‘a pound and a half’, *sesquihora*\(^3\) ‘an hour and a half’ and *sesquimodius*\(^4\) ‘a peck and a half’. It is because these expressions are equivalent to ‘$1\frac{1}{2}$ pounds’ etc. that *sesqui-* came to be regarded as a prefix which multiplies by $1\frac{1}{2}$; and in this role it appears particularly in the Latin adjective *sesquiplex*\(^5\) ‘$1\frac{1}{2}$ times the size’. This is the use which still appears in English ‘sesquicentenary’ etc.

Once only in Latin *sesqui-* appears, not as a prefix, but as a noun in its own right. The usage is a strange one, and to understand its strangeness we must be familiar with a small amount of arithmetical terminology. If there are two things of which the second is twice the size of the first, then we may express the difference in English in two ways. We may say ‘the second is greater than the first by as much again’; this uses addition to express the relationship and would be written mathematically as $b = a + a$. Alternatively, we may say ‘the second is twice the size of the first’; this time the expression is one of multiplication and would be written mathematically as $b = 2a$.

Latin has the same two types of expression: the second thing is either *altero tanto maiore quam primus*\(^6\) ‘larger than the first by as much again’.

---

1. This term goes back to Martianus Capella (5th century A.D.).
5. Cicero: *Orator* 188.
(which is addition), or *duplex quam primus* 'twice the size of the first' (which is multiplication). If the second thing is only $1\frac{1}{2}$ times the size of the first, Latin has the same two possible modes of expression, using either addition (*dimidio maior quam primus* 'half as big again as the first') or multiplication (*sesquiplex quam primus* '1½ times the size of the first').

We are now in a position to examine the passage of Cicero's *Orator* which provides the only extant instance of *sesqui-* used, not as a prefix, but as a noun in its own right. Cicero writes:

\[
\text{pes . . . qui adhibetur ad numeros partitur in tria, ut necesse sit partem pedis aut aequalem esse alteri parti aut altero tanto aut sesqui esse maiorem. ita fit aequalis dactylus, duplex iambus, sesquiplex paean.}
\]

'There are three types of metrical foot, in which one part of the foot is either exactly equal to the other part, or is larger than the other part by as much again, or is larger by one and a half times. Examples are respectively the dactyl (---), the iamb (--) and the paean (-----).

When we remember that in Latin scansion one heavy syllable (-) is equivalent to two light ones (---) the relevance of Cicero's examples becomes clear.

Instead of *sesqui* in the first sentence we should have expected to find *dimidio*, which would have given us two standard addition-type expressions as above. In the second sentence Cicero changed over to the multiplication-type expression with the adjectives *duplex* and *sesquiplex*. His phrase *sesqui . . . maiorem* is merely a fusion of the two types, a mixture of *dimidio . . . maiorem* and *sesquiplex*. It therefore adds nothing to our knowledge of the meanings of *sesqui*.

**B. Sesqui- and the superparticular ratio**

*Sesqui-* owes its function in expressing superparticular ratios to the terminology of the Pythagorean musical intervals. Pythagoras (6th century B.C.) discovered that, if a piece of string when plucked gives out a certain note, then the same piece of string, when stopped exactly half way along its length, will produce a note exactly an octave higher; in other words, that the ratio of the lengths of string required to produce an octave is 1:2. If the same piece of string were stopped two thirds of the way along its length, then the longer segment would produce a note exactly a fifth higher; so the ratio of the fifth is 2:3. In the same way, the interval of the fourth is 3:4; and it follows from the figures for the fifth and fourth that the ratio of the

---

9. See note 5 above.
whole tone is 8:9. It will be observed that these are all superparticular ratios.

Pythagoras called the interval of the octave τὸ διὰ πασῶν to dia pasôn: this is short for τὸ διὰ πασῶν τῶν χορδῶν διάστημα 'the interval through all the strings' (i.e. through all the notes of the scale). The fifth he called τὸ διὰ πέντε to dia pente 'the (interval) through five (notes)', and the fourth was τὸ διὰ τεσσάρων to dia tessaron 'the (interval) through four (notes)'. As diapason, diapente and diatessaron these terms were still in use in medieval times to denote these intervals.

When Plato (4th century B.C.) referred to these ratios in his *Timaeus* he changed the terminology. The fifth (ratio 2:3) became ἡ ἡμιολία διάστασις ἡ ἡμιολία διαστάσις, the fourth (3:4) ἡ ἐπιτρίτη διάστασις ἡ ἐπιτρίτη διαστάσις and the whole tone (8:9) ἡ ἐπογδόη διάστασις ἡ ἐπογδόη διαστάσις. The adjectives ἡμιολία, ἐπιτρίτη and ἐπογδόη refer to these (superparticular) ratios.

*Hēmiolía* shows the Greek prefix ἡμι- ‘half’ added to a root meaning ‘whole’; the resultant adjective indicates (as does the Latin prefix *sesqui-*) that something is 1½ times the size of something else. Ἐπιτρίτη and ἐπογδόη both show a prefix ἐπι- ‘in addition’: ἐπιτρίτη means ‘one third in addition’ (i.e. 1½ times the size) and ἐπογδόη ‘one eighth in addition’ (i.e. 1⅛ times the size).

These adjectives with ἐπι- had uses in other fields than the musical. Aristotle refers to ἐπιτρίτοι τοκοί ἐπιτρίτοι τοκοί ‘interest rates at an additional third’ (i.e. where the borrower pays back at the termination of the loan the principal plus an additional third as interest); and in scansion there was a metrical foot of the form ----, in which the first part consisted of three beats and the second of four, which was known as *pous epitritos* and is still called an epitrite.

The only Latin equivalent to ἡμιολίος was the very rare sesquiplex, and there was no Latin equivalent to the Greek adjectives with ἐπι-. That is why Aulus Gellius gives these careful definitions:

A number is *hemiolios* which contains in itself the whole of some number plus half of it, as three to two, fifteen to ten, thirty to twenty. A number is *epitritos* which contains in itself the whole of some number plus a third of the same number, as four to three, twelve to nine, forty to thirty.

Soon after Gellius’s time a Latin word *super tertius* was coined to represent

11. For example, Herodotus V 88 2.
14. Martianus Capella VII 761. It is the type of coinage known as a calque.
Greek *epitritos*; and by analogy with this was formed a compound *super-dimidius*\(^{15}\) as an equivalent (in meaning, not form) to *hēmiolios*. But as they do not contain the prefix *sesqui*- we shall pursue them no further.

A fragment of Cicero’s Latin version of Plato’s *Timaeus*\(^{16}\) is extant, and it includes the passage which refers to the Pythagorean ratios. Cicero, lacking Latin equivalents for Plato’s adjectives, resorted to coinage: he translated *hē hēmiolia diastasis* as *sesquialterum interuallum*, and used *sesquitertius* to represent *epitritos* and *sesquioctauus* for *epogdoos*. Here we have the origin of that set of compounds with *sesqui*- which are still used in English for superparticular ratios. In them *sesqui-* clearly does not mean ‘1\(\frac{1}{2}\) times’. Why, then, did Cicero use it in making these coinages?

We will start with *sesquialter*. This is Cicero’s equivalent for *hemiolios* ‘1\(\frac{1}{2}\) times’. It is clearly not a calque, for there is no semantic link between the simple adjectives *alter* and *holos*. On the other hand, the use of *sesqui-* ‘1\(\frac{1}{2}\) times’ in the Latin compound must be significant. Now, it would be possible to draw up a list of words on the following lines:

<table>
<thead>
<tr>
<th>Latin Word</th>
<th>Meaning</th>
<th>English Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>libra</em></td>
<td>‘a pound’</td>
<td><em>sesquilibra</em> ‘1(\frac{1}{2}) pounds’</td>
</tr>
<tr>
<td><em>pes</em></td>
<td>‘a foot’</td>
<td><em>sesquipes</em> ‘1(\frac{1}{2}) feet’</td>
</tr>
<tr>
<td><em>modius</em></td>
<td>‘a peck’</td>
<td><em>sesquimodius</em> ‘1(\frac{1}{2}) pecks’</td>
</tr>
</tbody>
</table>

and so on. It would also be possible to generalise from this list, using the Latin idiom *alter . . . alter*\(^{17}\) ‘the one . . . the other’, and add the general terms

*alterum* ‘a thing’ *sesquialterum* ‘1\(\frac{1}{2}\) things’

and this would seem to be how Cicero (not necessarily consciously) coined his word. Thus the interval of a fifth, using two strings of which one is 1\(\frac{1}{2}\) times the length of the other, becomes *sesquialterum interuallum*. In this compound *sesqui-* has its regular meaning of 1\(\frac{1}{2}\) times.

Now, the Latin adjective *alter* also frequently meant ‘second’\(^{18}\) (in a sequence); and this appears to have suggested to Cicero the possibility of replacing *alter* by *tertius* ‘third’ and so forming another compound *sesquitertius* which could do duty for Greek *epitritos* and mean ‘possessing an additional third’. And this opened the way to a whole series of adjectives formed by adding *sesqui-* to the ordinal numerals. They denote what are now called superparticular ratios.

But in coining these compounds on the analogy of *sesquialter* Cicero caused the prefix *sesqui-* to take on a new meaning; it became equivalent to *epi-* in the Greek adjectives mentioned earlier and so assumed the meaning

\(^{15}\) id. ib.

\(^{16}\) Sometimes called *De Uniuerso*.

\(^{17}\) *The Oxford Latin Dictionary* s.v. *alter* (pron.) 5.

additional’. Sesqui- had no historical right to this meaning; it has no etymological connection with Greek epi-, nor did Cicero necessarily imagine any such connection. In fact, the prefix gained this new meaning by accident, for in coining sesquitertius on the analogy of sesquialter Cicero ignored the fact that a change in the number at the root of the word changed the arithmetic of the compound as a whole. Yet such was the authority of the Ciceronian corpus that today the prefix still possesses this alien meaning.