

Please share your stories about how Open Access to this article benefits you.

The Science of Pronominal Usage:
He and *It* in Co-Reference to
Inanimate Objects in Late Middle
English Texts on Alchemy

by Peter Grund

2011

This is the author's accepted manuscript, post peer-review. The original published version can be found at the link below.

Grund, Peter. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358.

Published version: <http://dx.doi.org/10.1177/0075424210384225>

Terms of Use: <http://www2.ku.edu/~scholar/docs/license.shtml>

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

The Science of Pronominal Usage: *He* and *It* in Co-Reference to Inanimate Entities in Late

Middle English Texts on Alchemy

Peter Grund, University of Kansas

Abstract: This article explores the variation between *he* and *it* in co-reference to inanimate entities (such as *mercury*, *sulfur*, and *salt*). Using alchemical texts from the fifteenth century as material, the article demonstrates that there was much more variation in pronominal reference in this period than has previously been shown. Of the possible explanations suggested by previous research, the earlier grammatical gender system and transference from Latin do not seem to play a role, while pronoun clustering and pronominal reanalysis appear to influence the quantitative distribution. The scale of individuation used by Siemund (2008) and Stenroos (2008) to explain similar uses is shown not to be a straightforward *predictor* of the usage. Other factors such as personification and perceived similarities between animate and inanimate entities may affect the degree of perceived individuation. The choice of *he* over *she* seems to be influenced by pronominal reanalysis and straightforward personification in some cases. In other instances, it is speculated that the *he* usage reflects (stereotypical) gender conceptions in the Middle Ages.

Keywords: pronouns (*he* and *it*); grammatical and natural gender; pronoun clustering and pronominal reanalysis; co-reference; scale of individuation; personification; pragmatics; late Middle English; alchemical texts.

Introduction

In Present-Day English, when the third-person pronouns *he*, *she*, and *it* (including their object, possessive, and reflexive forms) are used to refer to people or objects, they normally agree with the sex of the person or lack of sex of the thing referred to. Men are referred to with *he*, women with *she*, and animate, non-human as well as inanimate entities generally take *it*. However, this system is notably flexible: *she* can be used in references to, for instance, ships and countries; *he* and *she* can refer to dogs, cats, and other animals, depending on whether the sex of the animal is known and on other situational factors; and *he*, *she*, and *it* are all possible when referring to a child (although in different contexts) (Quirk et al. 1985:314–18, 341–42). There is also

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

widespread geographical variation. In the traditional dialect of southwestern England, for example, *he* can refer to inanimate countable entities such as *knife*, while *it* is more common with referents denoting uncountable masses like *tea* (Ihalainen 1985:69; Siemund 2008:19–63). In informal spoken American English, *he* and *she* can refer to anything from a wooden leg to a bag of cement (Mathiot 1979:11; Svartengren 1928).

Although there have been many studies of the complexities of the system of English pronominal reference, several aspects of its historical development still remain uncharted. While much research has been done on the transitional period between Old English and Middle English and the shift from a grammatical to a natural gender system, very few studies cover the late Middle English period, when the system had allegedly become more fixed. This article demonstrates that there was much more variation in pronominal usage in this period than has previously been acknowledged. The article focuses on the variation between the pronouns *he* and *it* in co-reference to inanimate entities in alchemical texts from the fifteenth century (for the term *co-reference*, see Theoretical and Methodological Challenges below). While the writers and scribes never use the pronoun *she*, they frequently employ *he* as well as *it* for such thoroughly inanimate entities as *mercury*, *pot*, *stone*, and *sulfur*. Variation even occurs within a very limited context, as in Example (1).

- (1) þanne hast þou flour of bras þat neuere schal leve his colour And whenne **it** is soluid into watur **it** wole rubyfye bodyes and spirites into reed colouris that neuere schal faille and **he** is oon of þe retynacle3 þat is to seye þe constreyneris ouþur wiþhalderis of spirites and in hym arne manye privytees hidd [*Mirror of Lights*, Trinity College, Cambridge, MS R. 14. 37, ff. 128v–129r; rubyfye = turn red; spirites = volatile substances]¹

I will show that of the different explanatory frameworks suggested by previous research, some seem to influence the patterns in alchemical texts (such as clustering and pronominal reanalysis, and personification), while other factors appear not to have an impact on the usage (such as influence from the old grammatical gender system and from Latin). No factor provides a convenient blanket answer, however. More generally, I will demonstrate that early scientific texts (including alchemical writings) provide important linguistic material that can contribute significantly to our knowledge of the development of some linguistic features.

Background and Material

The present-day system of pronominal reference derives from a complex set of developments going back as far as Old English. Scholars such as Jones (1988) and Curzan (2003) have shown that the grammatical gender system prevalent in Old and early Middle English had more or less broken down by circa 1250, although the timeline probably varies in different regions of England (Stenroos 2008:451, 454–69). This means that instead of a system where determiners, adjectives, and pronouns agree with the more or less arbitrary grammatical gender of an antecedent noun (much like Present-Day German), English relied on a natural gender system after this period (ca 1250). This is primarily evident in pronominal reference, where *he*, *she*, *it* and forms of the three such as *her* and *himself* mostly agreed with the sex or lack of sex of the referent (for natural gender in Old English, see e.g. Moore 1921 and Heltveit 1958). However, as may be surmised by looking at the present-day situation (described earlier), this does not mean that the system was perfectly consistent after the 1200s. Particularly important for this study is the fluctuation in pronominal reference to inanimate objects. Previous studies have demonstrated that *it* had indeed taken over at this point but *he* and *she* could still be used to refer to a variety of inanimate objects

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

in the late Middle and early Modern periods, including the planets and other celestial bodies, body parts, water, the wind, cities, and ships (see e.g. Graband 1965:144–52; Nevalainen & Raumolin-Brunberg 1994:183–84; Curzan 2000:567–69, 2003:124–31). Some scholars, such as Morsbach (1926: 11) and Mausch (1986), have pointed to the possible influence from other languages on this type of usage, primarily Latin and French. Mustanoja (1960:48–51) and, in particular, Lass (1992:108), on the other hand, have strongly argued for the importance of personification, where the pronoun is chosen in accordance with the perceived female or male personality of the entity.

So far there has been little systematic empirical research into this type of pronominal reference in late Middle English, and the studies that exist primarily discuss literary texts. However, Curzan's (2003:128–31) study of Chaucer's *Astrolabe*, which contains a large number of inanimate objects referred to with *he* or *she*, underscores the importance of investigating early scientific texts. I have also shown that alchemical texts are striking in that they exhibit usage of *he* in co-reference to inanimate entities that have not been recorded in earlier studies, including mass entities such as *mercury*, *sulfur*, and *sal ammoniac* (Grund 2006a). More generally, the potential importance of alchemical texts is further highlighted by recent studies showing that scientific texts provide crucial, but hitherto neglected material for studies of the history as well as present stages of the English language (see e.g. Biber & Finegan 1997; the articles in Taavitsainen & Pahta 2004, and in Kytö, Rydén & Smitterberg 2006; Biber et al. 1999).

Research on early English writings on alchemy is still plagued by a dearth of editions. With one exception, the texts in this study have therefore all been transcribed from the original manuscripts (see References for more detail). Dating from the fifteenth century, the texts range from handbooks of alchemical practice with some discussion of theory (*Mirror of Lights*

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

and *The Consideration of the Quintessence*) to instructive dialogues (*Scoller and Master*) and straightforward recipes that provide instructions on how to produce a certain substance or carry out a certain procedure (see Grund 2003). The material totals ca. 61,800 words.

The aim of alchemical texts is to inform readers of the theoretical framework of alchemical practice and instruct them in how to conduct alchemical experimentation. The ultimate goal is for the reader to attain the philosophers' stone or elixir, a substance believed to transmute base metals into silver and gold, and to act as a universal medical remedy. Though this goal was in the end unattainable, numerous texts were produced outlining various technical laboratory procedures, some of which were adopted and adapted by later practitioners of chemistry (for accessible descriptions of alchemical theory and practice, see e.g. Roberts 1994:45–64; Holmyard 1990 [1957]). Although our knowledge of the transmission, dissemination, and ownership of alchemical texts in late medieval England is still limited, what we can say is that alchemical texts in English were produced in large numbers (see Voigts & Kurtz 2000), and they were widely read, making them important objects of study.

Theoretical and Methodological Challenges

One of the key concepts in an investigation of pronouns is the notoriously problematic *reference*. Some scholars use reference in a less technical sense to indicate the relationship between an anaphoric pronoun such as *she* and its antecedent noun, i.e. the pronoun refers back to an earlier noun or noun phrase. Other scholars, on the other hand, see reference exclusively as the pointing or referring to an extralinguistic entity, either in the real world or in a mental representation (Lyons 1977:660; Wales 1996:22–28). In my discussion above, I have used *reference* to denote both kinds of relationships. But in this study it is more useful to adopt the notion of co-referentiality: that is, the notion that the pronoun refers to the same entity to which its antecedent

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

also refers (Lyons 1977:660; Wales 1996:24, 28). This allows a consideration of both the extralinguistic co-referent and the linguistic antecedent.

There are at least two strong reasons to consider both. In the first place, it is not always clear what the antecedent of the pronoun is, or there may be no overt antecedent, as in Example (2).

- (2) Take camphor oz. 1, juse of þe grete morelle li. 1, mastic oz. 4, salte of askis 1, sal alkaley oz. 1, juse of titymal li. 1, oyle of hennebane li. 1, crude mercury li. ij. Medle þaym alle togedre and put **hit** in a vaisschel of erthe wel glasid [Recipes, Halversen (1998:356); morelle = a type of the herb nightshade; mastic = an aromatic gum; titymal = (the herb) spurge]

Here the pronoun "hit" (that is, *it*) does not refer back to a specific noun or noun phrase in the text; rather, readers have to infer from the context (and their knowledge of alchemical experimentation) that the pronoun refers to an implied *mixture* that will result from the blending of the substances listed (Wales 1996:23–24; cf. Curzan 2003:199–202). In my subsequent study, examples such as the one in 2 will be categorized as having an unclear or indeterminate antecedent. The referent, on the other hand, can usually be inferred. In the cases where a clear antecedent can be determined, the co-reference is always anaphoric, never cataphoric.

The second and perhaps stronger reason to pay attention both to the antecedent and to the extralinguistic referent lies in the very nature of the study. Extralinguistic reference clearly plays a considerable role in a natural gender system, where the form of the pronoun is not dependent on the more or less arbitrary grammatical gender of a noun, but on the sex or socially

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

constructed gender of a referent, or indeed the lack of gender. As will become apparent, extralinguistic factors appear to be influential in the selection of pronoun form in some contexts.

Overall Results

An overview of the results of my study is presented in Table 1. It includes all the instances of *he* (always spelled "he" in the texts) and *it* (found in the spellings "hit," "hyt," "it," and "yt") that occur in subject position and that are used in co-reference to inanimate objects (including substances and equipment).²

[TABLE 1 HERE]

The table reveals some striking results: *he* occurs as many as 95 times (or fifteen percent of the total number of occurrences of pronouns).³ At the same time, these overall figures gloss over a great deal of variation among the individual texts. *He* is clearly a minority form in all texts except one. *He* occurs primarily between ten and fifteen percent of the total number of instances in any given text although the percentage is 40 in one text in which the number of instances is fairly low overall (Recipes from the Trinity College manuscript). However, it is much more common in *Scoller and Master*, where it is the majority form. Like the recipes in Trinity College, MS R. 14. 37, however, *Scoller and Master* contains few instances of anaphoric pronouns overall. Nevertheless, the overall pattern is statistically significant ($\chi^2 = 47.4$, $df = 5$, $p < 0.05$). But since some cells yield low expected frequencies, the chi-square may not be valid.

The overview in Table 1 also hides substantial variation among the texts in usage with certain antecedent nouns (or noun phrases). Table 2 makes clear that *he* is the minority form in most instances, although different antecedents exhibit varying preferences. The antecedents

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

taking exclusively *it* have been merged into one category; the total of this category thus reflects the combined instances of all those antecedents. (This table has not been tested for statistical significance due to the many low expected frequencies.)

[TABLE 2 HERE]

He is the majority form in only very few cases (see e.g. *sal ammoniac*, usually designating ammonium chloride). *He* is as common as *it* in a limited number of cases (*atrament* and *sun*, i.e. gold), but pronominal reference in general is rare for all these categories. The greatest raw frequency of *he* is with *mercury* (as exemplified in 3), although *it* is again more common with this antecedent, though only barely (for the figure for *mercury*, see also note 5).

(3) Also Mercurie may be coagulate til **he** be hard metall with parffytt medycyne

[*Mirror of Lights*, Trinity College, Cambridge, MS R. 14. 37, f. 122v]

He is almost never used when the antecedent is a concrete noun designating a receptacle or utensil; the only exception is a lone example of *pot* (cf. *alembic*, *covering*, *glass*, *ingot*, *iron*, *pan*, *stillatory head*, and *vessel*). I will return to this trend below. It is clear, then, that, although *he* is far less common than *it*, *he* is still an option for co-reference to several inanimate entities.

Grammatical Gender and Influence from Other Languages

Perhaps one of the easiest ways to account for the usage of *he* would be to suggest that it represents a relic of the grammatical gender system, which has been proclaimed to have been defunct as early as at least two centuries before the texts of this study were composed. Curzan (2003:29, 100–2, 116–17), for example, suggests that there is a set of “resilient” nouns (including

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

city, moon, soul, and sun) that retain their allegiance to the old gender system much longer than other nouns. However, the evidence in the alchemical texts does not support such an explanation. Many of the antecedent nouns (or noun phrases) of *he* in the alchemical texts did not enter the English language until after the breakdown of the grammatical gender system. According to the *OED*, *matter, medicine, and metal*, for example, were not borrowed until the thirteenth century; the first attestations of *arsenic, powder, and sulfur* are from the fourteenth century; and *antimony* and *quintessence* first appeared in the fifteenth century. Consequently, these words have no traditional place in the old grammatical gender system. Of the words that existed in Old English or early Middle English, there is no clear trend as far as grammatical gender is concerned. A few words are masculine (*stan* 'stone,' *heofon* 'heaven,' and *pot*); only one is feminine (*sunne* 'sun')⁴; and a handful are neuter (e.g. *bodig* 'body,' *sealt* 'salt,' *tin* '[the metal] tin,' *wæter* 'water'). Since the alchemical texts do not follow older grammatical gender patterns for masculine nouns and since they incorporate many words that were not part of the older gendered system, it seems far-fetched to posit that the alchemical texts are holding on to an otherwise obsolete system.

Several scholars have suggested that transference from other languages was very influential in earlier periods of English in determining grammatical gender or pronoun selection (e.g. Morsbach 1926:11; Mustanoja 1960:45; see also Welna 1980 for Old English). Influence from other languages would not be very surprising in alchemical texts since most early texts are in fact translations or adaptations from Latin (Keiser 1998:3788–808). My texts are no different: with the possible exception of the recipes, whose origin is difficult to determine, all are primarily translations or reworkings of Latin compositions (see Grund 2006b:32–38, 2009, forthcoming; Halversen 1998:5–71). If there is indeed any influence from Latin, we would expect that the English antecedents taking *he* would predominantly have Latin equivalents that are grammatically masculine. (Although French influence cannot be completely excluded, I will

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

focus here on Latin since the connection between the alchemical texts and Latin is so close.) The evidence does not neatly point in one direction, however. In fact, if we exclude the unclear cases or words that vacillate in grammatical gender in Latin, most of the antecedent nouns that sometimes appear with *he* would actually be neuter in Latin (such as *antimonium* 'antimony,' *corpus* 'body' [= substance], and *aurum* 'gold'); and there are almost as many feminine (e.g. *materia/materies* 'matter,' *quinta essentia* 'quintessence,' and *aqua* 'water') as masculine antecedents (e.g. *mercurius* 'mercury,' *lapis* 'stone,' and *sol* 'sun' [= gold]). If we also consider the antecedent nouns of *it*, the picture is very much the same: some are masculine (such as *sol* and *spiritus*), some feminine (such as *gutta* 'drop,' and *Luna*), but most of them are neuter (such as *vinum aegrum* 'vinegar,' and *auripigmentum* 'orpiment'). Thus, no straightforward influence can be seen from Latin in my material.

Clustering and Pronominal Reanalysis

Another possibility is that the usage of *he* is influenced or triggered not by the antecedent noun or by the co-referent but by other pronominal forms in the near context. Perhaps not surprisingly, there is a tendency for *he* forms to cluster. In other words, if a *he* form is once introduced, subsequent pronominal forms in the near context (fifteen words or fewer) sometimes follows suit, as in Example (3).

- (3) And þenne stoppe hit faste ayene and sette hit in þe fire and loke þat þe matiere rise not vppe nomore to þe potte is mouthe. And yf **he** rise no more, þenne is **he** fixe ynowe þenne. [Recipes, Halversen 1998:335–36]

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

Table 3 shows the distribution of *he* and *it* according to whether it is preceded by *he*, *it* (the subject form), or no pronominal form in the near context.

[TABLE 3 HERE]

As the table makes clear, the pronominal forms following an already introduced *he* are overwhelmingly *he*: 26 instances or 87 percent. Conversely, a subject *it* almost exclusively (96 percent of the instances) triggers a following *it* form. Put in another way (not in Table 3), 27 percent of the instances of *he* are preceded by *he*, while only about one percent of the instances of *it* follow instances of *he*; only four percent of the *he*-instances are preceded by *it*, while the corresponding percentage for *it* is 17 percent. The distribution shown in Table 3 is statistically significant ($\chi^2 = 131.2$, $df = 2$, $p < 0.05$), but since some cells yield low expected frequencies, the chi-square may not be valid. The figures can therefore only be taken as a suggestion that once a *he* form is introduced it is more likely to trigger a subsequent *he* than *it*, and vice versa.⁵ There is some support for this suggestion in previous research, however. A similar tendency is reported by Pawley (2002:114) for Present-Day Tasmanian English. He claims that once the language user has selected *he* or *she* for a particular inanimate entity, the user often continues with *she/he* "within the same discourse unit" (Pawley 2002:114).

Adding to this clustering tendency is the possible influence from forms such as *him*, *himself*, *his*, *it* (in various object functions), and *itself*. As mentioned earlier (note 2), I left these forms out of earlier tabulation because they are ambiguous. *Him*, *himself*, and *his* can serve as object, reflexive, and possessive forms for both *he* and *it* in this period, and there is no variation between *it* (in various object functions) and a similarly unambiguous object form for *he*. At the same time, there was certainly an ongoing shift in the language in the fifteenth century: *it* was

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

beginning to be used even after prepositions instead of the old dative *him*; *it* could also be used as a possessive form; and there were different periphrastic options such as *thereof* that could replace *his* (Mustanoja 1960:130–31, 157–58; Nevalainen & Raumolin-Brunberg 1994). With a system in flux, one may perhaps expect some "confusion" in pronominal forms and their interpretation. Curzan (2003:96), for example, makes a similar case for reinterpretation of pronominal forms in the much earlier *Cura Pastoralis*. Perhaps, then, the forms *him*, *himself*, and *his* were being increasingly associated with *he*, and, even though they were technically inflected forms of *it* in a given context, they could be re-analyzed as being forms of *he* and therefore trigger a subsequent *he* form. This would also conveniently explain why forms of *she* are absent from the material. An example where *he* is preceded by *him* is found in (4).

- (4) R_o ij^o partes aschis made of oke & o parte calssis viui & make a strong ly þerof with water of venegire or with sum oþer ly made f byfore þen take sulfur viue & breke **it** to gret gobetes as bense & put **it** in to a strong glasse & put a quantite of 3owre ly on **him** þat **yt** be helde & stop 3owre glasse þat **yt** vapor not & set **it** in a furnes & seþe **it** þer ffro þe morne to viij of þe cloke or ix & let **it** kelle þen hell þe ly fro **him** & lay **hym** in þe sunne to dry & when **he** ys dry þen put **him** in to þe glas a3en & 3ef **him** new ly as tofore & seþe **him** iij oures þerin & let **him** kelle & dry **hym** a3en as byfore [Recipes, Corpus Christi College, Oxford, MS 226, ff. 43v–44r; R_o = recipe/recipe *i.e.* take; calssis viui = quick lime; helde = covered, hell = pour; 3ef = give]

Table 4 shows that there is some support for the assumption that the object, reflexive, and possessive forms may influence the usage.

[TABLE 4 HERE]

The table includes the number of occurrences of *he* or *it* when preceded by a *him*, *himself* and *his* or *it* (as an object or prepositional object) and *itself*. This table leaves out the instances of *he* and *it* when they are preceded by the subject forms *he* and *it* (as shown in Table 3 earlier; see also Table 5 below, which merges the results). The most striking result is probably that *he* is exceedingly rare if an *it* (as an object or prepositional object) or *itself* appears in the near context preceding *he*: only two percent (or four instances) of the total number of instances preceded by an *it* form are *he*, while *it* is predominant. In the case of *him*, *himself*, and *his*, the majority of forms are *he* (61 percent). However, not surprisingly considering the history of the forms, *it* also occurs with some frequency after these pronominal forms: 17 instances or 39 percent are represented by *it*. Like the results in Table 3, the distribution in Table 4 is also statistically significant ($\chi^2 = 112.8$, $df = 2$, $p < 0.05$), but, again, some cells yield low expected frequencies, which may render the chi-square invalid.

To explore the full extent of the influence, I have merged the results from Table 3 and 4 in one table (Table 5). This table joins the results for *he*, *him*, *himself*, and *his*, on the one hand, and *it* (as subject, object, and prepositional object) and *itself*, on the other.

[TABLE 5 HERE]

Table 5 underscores the results seen in the previous two tables, and the distribution is statistically significant ($\chi^2 = 220.3$, $df = 2$, $p < 0.05$). This clearly indicates that pronominal forms in the near context may have a major impact on pronoun selection. There is a strong (though not exclusive)

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

correspondence between *he* and *he*, *him*, *himself*, and *his* and between *it* and *it* (in various functions) and *itself*. This pattern may indeed be a sign of the general change taking place during this period where *him*, *himself*, and *his* became increasingly associated with *he* and less with *it*, although variation continues into the early Modern period and later. It is not completely clear why this trend would be present in alchemical texts, but not noticed in other texts. Although perhaps part of the reason may be that not much research exists on material from this period in general, it may also be because pronouns (in all functions) are very common in alchemical texts, and especially in alchemical recipes, which rely heavily on pronouns instead of repeating the full name of the substance or piece of equipment (see e.g. Example (4) above). Whether this kind of structuring is conducive to pronominal reanalysis would have to be tested on related texts from the same period, such as medical texts, which also include recipes and instructional discourse. The newly released corpus of Middle English medical texts (Taavitsainen et al. 2005) would provide excellent material for such a study. It must also be noted that, although the influence from other pronominal forms may go a long way toward accounting for the quantitative distribution, other factors must also have been involved since pronouns are not always present in the context.

Individuation, Personification, and Pragmatics

In studies of present-day dialects (20th century), it has been argued that dialect speakers from some areas make a distinction between pronominal co-reference to inanimate *count* nouns or noun phrases (i.e. nouns that can be used in the plural) and pronominal co-reference to inanimate *mass* nouns or noun phrases (Ihalainen 1985:69; Morsbach 1926:30; Wales 1996:138–39; Siemund 2008:20–21). Siemund (2008:3–4, 143) builds on the mass vs. count distinction to argue that variation between *he/she* and *it* in a number of varieties of English is determined by the

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

degree of "individuation" of the co-referent of an antecedent noun (or noun phrase) and the pronoun. That is, the higher up that an entity is on a scale of individuation or degree of discreteness or individuality (from human via animal, concrete inanimate, and abstract inanimate, to materials/liquids) the more likely it is that *he* or *she* will be used (2008:221; see also Comrie 1989:191–99; Croft 1990:111–17; Yamamoto 1999:131). Different communities seem to have different cut-off points: for some, there is a clear dividing line between animates and inanimates, while others will push the *he/she* usage into the territory of concrete or abstract inanimate. However, the most consistent pattern in Siemund's material is that materials/liquids will almost never take *he* or *she* because they are not seen as "individuated" or discrete entities. In a recent study of early Middle English texts (1175–1300), Stenroos (2008) provides some historical evidence supporting Siemund's hypothesis. She shows that individuation may have played a role in the retention of grammatical gender vs. change toward using *it* in co-reference to inanimate entities. Inanimate entities that still take pronominal co-reference based on their Old English grammatical gender are highly individuated, according to Stenroos (2008:463–66); co-references with *it*, on the other hand, are mainly found with mass or uncountable nouns, whose co-referent is seen as having a low degree of individuation (2008:466).

My data runs counter to Siemund's and Stenroos's findings. The instances involving *he* concern primarily non-count entities, such as *arsenic*, *gold*, *mercury*, *powder*, and *sulfur* (see Table 2 above). The count entities are in the minority (e.g. *medicine* and *pot*). However, as noted before, the overwhelming majority of noun phrases take *it*, whether count or non-count. There are several count antecedents or co-referents that never take *he* (as seen previously in Table 2), among them *alembic* ['a receptacle used for distillation'], *covering*, *glass*, and *vessel*. My alchemical texts would appear to show that the cut-off point for *he* can indeed be pushed all the way to the extreme of materials and liquids in some contexts, and that the

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

individuation scale is not always a helpful framework for the *prediction* of what antecedents or co-referents will trigger a "gendered" pronoun form. Siemund (2008:134) himself recognizes the problem that instances of *he* and *she* in co-reference to mass nouns (or noun phrases) pose in his discussion of Svartengren's (1927) study. However, he does not address this phenomenon, instead leaving it for future studies (see Wales's 2009:509 criticism of Siemund's study because of this).

This of course does not necessarily mean that the scale of individuation is not relevant for my examples. If we assume that it is operative, it may mean that the co-referents of *he* in the alchemical texts are somehow seen as individuated. The question is how we can determine such individuation without resorting to circular reasoning or ending up with an argument that cannot be proven or disproven: *he* alone cannot be taken as a clear indication of individuation because it would be the only sign. Other contextual factors would have to be taken into consideration. One such factor is personification, which is claimed to have promoted the usage of *she* or *he* for inanimate entities from the Middle Ages up to the present day (Morsbach 1926:20, 28–29; Mustanoja 1960:48–51; Graband 1965:144–45; MacKay and Konishi 1980; Lass 1992:108; Quirk et al. 1985:341; Wales 1996:146–52; Siemund 2008:161–62). However, in these studies, the concept of personification is frequently taken for granted rather than clearly defined, and it seems to cover a number of related phenomena rather than one uniform trend (see e.g. Bloomfield 1963 for a discussion). For my discussion, as we shall see below, it is crucial to distinguish between clear anthropomorphizing and other trends. I will therefore follow MacKay and Konishi (1980:151), who in turn follow Shaw (1972:283), in defining personification as occurring "whenever abstractions, animals, ideas, and inanimate objects are endowed with human form, character, traits, or sensibilities" (see also Pawley 2002:113). This means that unless there

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

are other indicators in the text, a pronoun alone cannot signal personification (cf. MacKay and Konishi 1980:152).

Personification would perhaps seem out of place for a category of text that deals with "scientific" matters, involving substances and technical equipment (see Morsbach 1926:25, 28; Graband 1965:145). However, personification is well attested in alchemical texts in general and is related to a number of other strategies (allegories, symbols, codes, etc.) that were employed by alchemical writers allegedly to hide the true meaning of their writings (Holmyard 1990 [1957]:153–64; Roberts 1994:65–91; Abraham 1998). At the same time, these kinds of strategies appear more commonly in alchemical texts dealing with theory rather than practice (see Grund forthcoming). Although we may not expect to find personification in the texts of this study since they treat primarily practical matters, fairly straightforward personification does occur, quite surprisingly, in an alchemical recipe, the practical text category *par excellence* (given in Example 5).

- (5) Take *mercury* & wasch it *with* *wynager* & salt as the *maner* ys þanne take þat water that **he** most hatyþ & zeue hym to drynke til his body be tobrost & so ys **he** poysonyd & dede þen take anoþer water that **he** most louyþ & zeue hym to drynke til **he** wex on lyfe azen þan **he** semyþ quike but **he** ys dede for lat hym stonde al nyght & on the morne þou shalt fynde hym dede & harde for **he** hath cast out his medicine that made hym quicke þat was his owne blode þan kepe þat blode by hymselfe & do hym þat ys the body in a sepulcre... [Recipes, Corpus Christi College, Oxford, MS 226, f. 105r; tobrost = broken to pieces]

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

In this extract *mercury* clearly takes on human characteristics: *he* hates, is poisoned, loves, dies, and is buried. This is a parade example of personification (in accordance with the definition adopted above). In this case, by default, *mercury* would be individuated since it is indeed seen as humanlike (which is the extreme end of the individuation scale and individuatedness) and would naturally take a "gendered" pronoun. Personification has "upgraded" *mercury* on the scale of individuation: it is clearly no longer viewed as an inanimate substance.

But this passage (containing twelve instances in all, not all shown in the example) is also the only case of clear personification, as defined earlier. However, there may be other indications that the co-referents of *he* are seen as having certain characteristics in common with animate entities, and are hence again perceived as more individuated and no longer as mere substances or materials. What stands out in the contexts in which *he* appears is the verb type, often signaling activity, action, or motion. In Example (6), for instance, *he* is used in co-reference to quintessence, another term for a highly refined alcohol. In this case the inanimate substance is seen as actively extracting additional quintessence from other ingredients. (The semantic verb type will be dealt with more fully below; see Table 8.)

- (6) Ergo, yf þou wylte medle oon of thees or many in oure quynte essence or as muche as þou wylte withynne iij houres, **he** shal draue to hym quynte essence of þaym with alle his vertues. [*The Consideration of the Quintessence*, Halversen (1998:146)]

Indeed, several notable differences appear between the verb types and verb constructions co-occurring with *he* and *it*. Table 6 shows the distribution of passive and active constructions with *he* and *it*. I have provided figures for the overall distribution as well as for the distribution with

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

intransitive and copula constructions excluded. The reason for this exclusion is to show figures where there is at least the potential for a true choice between active and passive.

[TABLE 6 HERE]

Although the percentage of active constructions for *he* is slightly higher than that of passive constructions, there is no statistical significance to the overall distribution. However, if copulas and intransitives are excluded, the distribution is statistically significant ($\chi^2 = 13.4$, $df = 1$, $p < 0.05$), suggesting that the passive vs. active distribution is important for the selection of *he*. Additional support for this split is perhaps found in the fact that nine out of the fourteen examples of *he* in the passive are preceded by another *he* form with an active verb or by *him*, *himself*, or *his*. So, if pronominal reanalysis is an influential factor (as discussed in Clustering and Pronominal Reanalysis), it would indicate that the connection between *he* and the passive is possibly even weaker.

The type of verbs that the two pronouns take is also of interest, both in terms of complementation patterns and semantic categories. The distribution according to complementation patterns (transitive [including ditransitive *give* and one example of a complex transitive], intransitive, copula) is shown in Table 7.

[TABLE 7 HERE]

The difference between *it* and *he* lies primarily in the use of intransitive and transitive verbs, while the percentage is approximately the same for copulas (36 percent vs. 38 percent). If we exclude the unclear cases (to avoid a low expected frequency), the results approach significance

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

($\chi^2 = 5.4$, $df = 2$, $p < 0.05$). The chi-square calculation also indicates that the contribution of the copula results to the patterns is negligible, suggesting that the transitive vs. intransitive split is potentially important.

The semantic categories of the verbs with which the two pronouns occur point in a similar direction (as illustrated in Table 8).

[TABLE 8 HERE]

A few patterns stand out in the table. In all categories that show more than ten total occurrences, *it* is the more common pronoun. However, the proportion of the two pronouns differ significantly. Among the categories of verbs that occur more than ten times, the percentage of *he* is much higher for Activity/Action (as in 7) and Motion verbs (as in 8) than for the percentage for *it*. *It*, on the other hand, is predominant with Process verbs (as in 9 and 10).

(7) Sal comune bereth þe keye of þis craft ffor **he** openith and closith alle thyngis/
[*Mirror of Lights*, Trinity College, Cambridge, MS R. 14. 37, f. 118r]

(8) And þerefore þou muste close and bynde hym strong and syker in a glasyn vaisschel
sownde and cloos withoute porys, leste **he** shape and passe oute of þy gouernance.
[*The Consideration of the Quintessence*, Halversen (1998:135); syker = securely;
shape = escape]

(9) inbibe þat vitrialle þerwith on a stone till **it** dissolue & let it run into a glasse
[Recipes, Corpus Christi College, Oxford, MS 226, f. 44v]

- (10) make a serkyl fier þerabowte þat **yt** may melt & let yt stonde þer þe space off 1
howre [Recipes, Corpus Christi College, Oxford, MS 226, f. 54r]

Further patterns emerge if we look at the verb category in combination with complementation patterns. The most striking pattern is with process verbs, including *boil*, *congeal*, *distil*, *dry*, *fix*, *solve*, *sublime*, *turn*, and *vapor*. These verbs frequently occur with *it* as the subject in the kind of intransitive construction exemplified in Examples (9) and (10), which involves a change from one state into another. *He*, on the other hand, only occurs once with *solve* and once with *still* (i.e. *distil*); three instances involve the verb *break*, two of which occur in near-context. There is thus a strong correlation between *it* and this verbal category. *He* instead occurs seven times or 11 percent of the instances of constructions with motion verbs, which are intransitive. But it should be underscored that the figures for *he* with intransitives are low overall (see Table 7).

With the transitives, there are also differences. *He* is primarily found with action or activity verbs (25 out of 44 transitive examples or 57%), while the percentage for *it* (74 out of 187 or 40%) is lower; see examples (6) and (7) earlier. With *process* verbs, *it* is proportionally more common, but most examples are in the passive: 80 out of 97 transitive examples, or 82%, are passive.

The copula examples (not given in Table 8) are very similar for *he* and *it*. They are particularly common at the end of alchemical recipes, indicating the result that the practitioner should look for, as in (11) and (12). Although most of the examples indicate states, there are also examples of *he* that indicate a more dynamic role, as in (11), or a more active one as in (13), suggested by the agentive "medlere."

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

- (11) And if thy medycyn be nat fusyble turne ageyn to his dissolucion and congelacion til **he** be fusyble at thy will [Recipes, Trinity College, Cambridge, MS R. 14. 37,f. 156r]
- (12) Caste þerfore oo part of it/ onto ten thousand partes of mercurie crw. well purgid and **it** schal be the beste lune of alle [*Mirror of Lights*, Trinity College, Cambridge, MS R. 14. 37, f. 144v; mercurie crw = unrefined mercury; lune = silver]
- (13) Take first sal Armoniac ffor **he** is medlere wiþ þe firste and *with* the secounde [Recipes, Trinity College, Cambridge, MS R. 14. 37,f. 151r]

Although the results do not reveal an overwhelmingly uniform trend, *he* is proportionally very common with Activity and Motion verbs, while rare with Process verbs especially in intransitive constructions but also in the passive. At least sometimes, then, the verbs indicate that the substances to which *he* co-refers are seen as actors or at least active. When the co-referents of the pronouns are seen as passive entities that are being acted upon, *he* is rare.

Similar results have been found in other studies. MacKay and Konishi (1980:156) note a difference between an active agent *he* and a passive object *it*, in co-reference to a *pea*. Mobility or motion has also been found to be a factor in the selection of "gendered" pronouns in Newfoundland English, where mobile concrete entities take *she*. However, it should be noted that *he* is used for concrete *non-mobile* entities (Wales 1996: 138–39; Siemund 2008: 66–75). What the patterns may suggest, then, is that at least some of the verbs indicate that the co-referents of *he* may have been upgraded on the scale of individuation and are perceived as being more than barely individuated or unindividuated substances, materials, or liquids. There may be some support for this suggestion if we look at the problem from the point of view of the semantic

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

framework of thematic roles. In this framework, *he* in the alchemical texts would frequently (though not exclusively) be described as the *actor* (or agent) or "the deliberate, potent, active instigator of the predicate" (Frawley 1992:203). *He* is very infrequently a *patient* or recipient of the verbal action in the alchemical texts (see e.g. Saeed 2003:148–74): the role of *he* as a patient primarily occurs in the passive constructions, which are relatively few (as noted earlier), while *it* is the patient in a number of intransitive constructions with process verbs, again as noted earlier. What is of great interest here is that, in studies of thematic roles, the agent is very often equated with volition, intention, and animacy (Frawley 1992:203; Saeed 2003:170). It is even suggested that certain verbs are cognitively set up to require certain roles, such as agent, patient, etc. (Saeed 2003:170). If this is true, the selection of at least some of the verbs would be unlikely unless the co-referent of *he* was seen as sharing some animate, perhaps even human characteristics, though the human aspect is far from clear in the absence of other indicators. If we follow that line of argument – that the co-referents of *he* are seen as sharing some animate characteristics, characteristics which are normally associated with entities higher up on the scale of individuation – the case may be that they have been upgraded on the scale of individuation, being seen as more individuated than mere substances or materials.

There are several problems with this scenario, however. It is important to underscore that some of the very same active verbs and constructions that occur with *he* may also occur with *it*, and the overall frequency of *it* with activity and action verbs is about three times that of *he*. An illustrative case is found in *The Consideration of the Quintessence*. It contains four examples of *he* and the verb *draw* (see Example 6), but *it* is also used in very similar contexts with the same verb six times. If there is a connection between the verb, the degree of individuation of the co-referent, and *he*, it raises the question why the co-referent was not seen as equally individuated in the examples where *it* was selected together with *draw*. The context does not provide any further

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

clues here. Furthermore, *he* does occur in passive and intransitive constructions (albeit relatively rarely) where an active instigator role is not apparent, and not all active constructions are equally agentive (in terms of clear control, volition, or intention). In these cases, other factors may of course be involved, such as the clustering effect or pronominal reanalysis, or factors not recoverable from the context. But these caveats do weaken the argument.

The greatest issue is perhaps that, even if the co-referents of *he* are indeed seen as individuated or as at least more individuated than mere substances and liquids, it simply pushes the *why* question to a different level: why would the co-referents be seen as individuated? Although my *he* examples may not contradict the scale of individuation, they are also not straightforwardly explained by it. Personification, the making human of an inanimate, is clearly part of the answer, but as we have seen, it only accounts for a limited number of instances. Instead, the answer may lie (as at least hinted at above) in the possibility that some co-referents may have been seen as sharing characteristics that are usually connected with animate beings (as indicated by the verbs). Support for this kind of transfer comes from Mathiot's (1979) study. On the basis of results from a survey of informal spoken American English, she shows that *he* and *she* can be used for inanimate entities if they are seen to have features that are (stereotypically) associated with males or females or that reflect language users' attitudes or feelings toward men and women (1979:12). Mathiot (1979:6–7) also argues that these uses of *he* and *she*, which "upgrade" an inanimate entity, are "governed by intimacy," which mostly occurs in in-group contexts (see also MacKay and Konishi 1980; Pawley 2002).⁶ While the intimacy factor cannot be discerned from my texts and would be surprising in alchemical texts, what is of interest here is the connection drawn by Mathiot (1979) where perceived characteristics or even attitudes and feelings can trigger *he* or *she*. If we leave aside for the moment why *he* and not *she* is used, some of the verbs again perhaps suggest a connection if not with human action then at least with

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

features associated with animate, active beings. This does not mean that they were seen as animate per se, only that they possessed certain features in common with animate entities (see also Curzan 2000:571–72, discussed in more detail in the next section). This is admittedly speculative, but I will return to some reasons in the next section.

Why *he*?

There is one further problem with the variation between *he* and *it*. Why do we always find *he*'s and never *she*'s? In the cases that variation has been attested in previous research, the underlying reason for selecting *he* over *she* or vice versa is far from always pursued. Siemund (2008:5) makes clear early on in his study that he does not intend to address the issue in any detail (see Wales 2009:509 for criticism of this issue). Pawley (2002:135), on the other hand, simply concludes that "[m]aking sense of gender assignment in varieties of English remains a challenge." In my case, there is an added problem of dealing with historical texts that have been removed from a specific sociocultural context, one that is very difficult to trace with certainty. My suggestions must therefore be taken as tentative.

The discussion of pronominal reanalysis clearly suggested that the pronominal forms *him*, *himself*, and *his* influence the selection of pronoun, since they are usually followed by *he*. This would be a very convenient answer to the slightly puzzling absence of *she*. However, this is clearly not the only factor involved since these pronominal forms do not precede every instance. Other factors must thus not surprisingly be involved. In the passage that exhibited clear personification (Example 5), the motivation for co-referring to mercury with *he* is probably the easiest to account for. The very strong association between *mercury* and the planet and Greco-Roman god Mercury is probably behind this usage (Abraham 1998 s.v. *mercurius*). But other co-references are more difficult to resolve. Several studies have noted a "masculinization tendency"

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

in (early) Middle English. This tendency manifests itself in nouns (or noun phrases) that refer to inanimate entities taking adjectives and determiners inflected according to masculine gender or, more importantly, taking a masculine pronoun although they were not historically masculine (Morsbach 1926:21; Clark 1957:115; Mustanoja 1960:51; see also Welna 1980:400). However, it is mostly unclear from previous research exactly when this tendency was allegedly at work, although Curzan's (2003:108, 126) study suggests that it was not operative in early Middle English (before 1250). Furthermore, the reason for this tendency has not been satisfactorily explained. Curzan (2003:126) suggests that it may "represent an extension of the use of the masculine as a default pronoun for animate nouns," but she does not try to explain it further.

The usage of *he* in the alchemical texts may indeed be part of this previously noted "masculinization tendency." But the question remains why the tendency occurred at all. Of course, the issue cannot be solved without taking into consideration much larger and much more varied material, but my data suggests that one possibility is worth highlighting. Perhaps the issue cuts to the heart of gender conceptions in late medieval England. Discussing early Modern English, Curzan (2000:571–72) suggests that some inanimate entities, although they did not possess biological sex, could be classified as masculine or feminine because they shared certain characteristics or traits associated with either sex. This is founded on the fact that biology and socially constructed gender were inseparable, and neither was seen as more primary, according to Curzan (2000). This is clearly related to Mathiot's (1979) suggestion noted in the previous section. This would mean that *he* is used because the co-referent was seen as possessing some traits connected with maleness. If that is indeed true, tracing the exact characteristics or features that may have triggered the usage is very difficult, especially since we do not know the context of the author, and we only have incomplete knowledge of gender conceptions in late medieval England. Recent research has shown that although there were certainly stereotypes in terms of

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

gendered characteristics, such as male equals active and female passive, medieval conceptions of gender are quite complex and frequently cannot be reduced to simple binary relations (Cox 1997:9; Karras 2003:2). If the alchemical authors or scribes subscribed to the stereotypical passive vs. active distinction, maybe the action or activity verbs, noted above, indicate an equation of the inanimate substances with an "active" male instead of a "passive" female. But that would perhaps beg the question why the "passive" entities are always *it* in my texts and never *she*. Again, this would require further research on a larger and more varied set of material.

Concluding Remarks

My study of a number of alchemical texts has revealed a previously unexplored aspect of pronominal co-reference in the late Middle English period, which points to much more variation in the system than has been previously shown. The writers employed *he* in an anaphoric relationship to a number of a noun phrases co-referring to inanimate objects and substances. My discussion shows that several factors may be influencing this usage, clustering and pronominal reanalysis perhaps being the most important. Previous research on both historical and contemporary material has shown that attitudinal, emotive, situational and cultural features all play a role in gender assignment in language. Although these features are difficult to trace in modern material, they present even more acute challenges in historical material, where the mind-set and cultural conceptions of the language users are not always readily accessible to us. This article underscores these difficulties by illustrating the complexities of the pronominal system in alchemical texts. In using alchemical texts as material, I have demonstrated that non-traditional material can increase our knowledge of the scope and flexibility of the pronominal system in historical periods. Naturally, studies of other fifteenth-century texts are needed to reveal whether the patterns are genre specific and, if so, what such genre specificity may mean for studies of

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

gender in language and pronominal usage. More research is definitely required in order for us to patch together a more comprehensive picture of the usage of *she*, *he*, and *it*, and the parameters of their usage.

Notes

* I am grateful to Anne Curzan, James W. Hartman, Renee Perelmutter, Robin Queen, Erik Smitterberg, Molly M. Zahn, and anonymous reviewers of the journal for comments and suggestions on earlier versions of this article. Naturally, any errors are entirely my own.

1. The transcription of the examples follows the original manuscripts as closely as possible. Capitalization and punctuation have been retained. Abbreviations have been expanded and the expansions italicized. Material enclosed within curly brackets {...} has been added above the line by the scribe.

2. I excluded from this table the object form *him*, the possessive form *his*, and the reflexive *himself*, as well as *it* appearing as a direct, indirect, or prepositional object, and *itself*. The reason for this is that *his*, *him*, and *himself* could still be used as the possessive, object, and reflexive forms of both *he* and *it* in late medieval English, and they cannot be disambiguated as masculine or neuter in any given context (Mustanoja 1960:130, 157; Barber 1997:150). Similarly, as there was no clear variation in the object function in the *it* paradigm (between *it* and a different, unambiguous form in the *he* paradigm), instances of *it* performing this function were excluded from the table. However, some of these forms will be considered in the section Clustering and Pronominal Reanalysis.

3. Naturally, there are instances, although fairly few, of *he* co-referring to animate entities, primarily alchemical authorities. Since the focus is on inanimate entities in this study, I excluded all these *he* examples. It may be noted that the use of *he* for animates does not seem to

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

influence the use for inanimates. For instance, the animate examples do not consistently appear in the near context of the inanimate examples. Co-occurrence might have indicated influence from one usage on the other. Furthermore, there are no instances of *it* for animate entities.

4. From early Middle English onward, *sun* is often treated as masculine, probably owing to influence from Latin *sol* or French *soleil* (Mustanoja 1960:46).

5. The clustering effect may also be important for the calculation of the figures for antecedents. If pronouns cluster, they may co-refer to each other rather than to the initial co-referent and antecedent and hence inflate the numbers. In most cases, the clustering does not seem to affect the overall figures, since *he* is almost never very frequent with any one antecedent or co-referent. However, it does affect the figures for *mercury*. In the passage given partly in Example 5, as many as twelve of the 28 instances that appear in this text cooccur. In this case then, cooccurrence may have a significant impact on the numbers of a particular antecedent.

6. Pawley (2002:116) even suggests that salience may play a role in Tasmanian English. If an entity is important in the discourse, it will receive *he* or *she*; otherwise, *it* will be used. I find no clear support for this in my texts, without resorting to a circular argument. That is, there are no other clear indicators in the context that would indicate greater salience on the part of the co-referents of *he*. Furthermore, even if salience is involved, it does not account for why the alchemical writers would have preferred *he* to *she*.

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

References

Primary sources

The Consideration of the Quintessence (Halversen 1998:116–202). 18,200 words

Mirror of Lights (Trinity College, Cambridge, MS R. 14. 37, ff. 115r–47r). 10,700 words

Recipes (Corpus Christi College, Oxford, MS 226, ff. 25v–26v, 37v–40v, 42r–45r, 46v–56v, 100v, 105r, 108r, 110r–13r, 136v, 143r–43v, 145v–46v). 21,800 words

Recipes (Halversen 1998:333–57). 5,700 words

Recipes (Trinity College, Cambridge, MS R. 14. 37, ff. 147r–56v). 3,100 words

Scoller and Master (British Library MS Sloane 3747, ff. 66r–71v). 2,300 words

Secondary sources

Abraham, Lyndy. 1998. *A dictionary of alchemical imagery*. Cambridge, UK: Cambridge University Press.

Barber, Charles. 1997. *Early Modern English*. Edinburgh: Edinburgh University Press.

Biber, Douglas & Edward Finegan. 1997. Diachronic relations among speech-based and written registers in English. In Terttu Nevalainen and Leena Kahlas-Tarkka (eds.), *To explain the present: Studies in the changing English language in honour of Matti Rissanen*, 253–75. (Mémoires de la Société Néophilologique de Helsinki 52.) Helsinki: Société Néophilologique.

Biber, Douglas, Stig Johansson, Geoffrey Leech, Susan Conrad & Edward Finegan. 1999. *Longman grammar of spoken and written English*. Harlow: Longman.

Bloomfield, Morton W. 1963. A grammatical approach to personification allegory. *Modern Philology* 60(3): 161–71.

- Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)
- Clark, Cecily. 1957. Gender in 'The Peterborough Chronicle' 1070–1154. *English Studies* 38(3): 109–15.
- Comrie, Bernard. 1989. *Language universals and linguistic typology*. 2nd edn. Chicago: University of Chicago Press.
- Cox, Catherine S. 1997. *Gender and language in Chaucer*. Gainesville, FL: University Press of Florida.
- Croft, William. 1990. *Typology and universals*. Cambridge: Cambridge University Press.
- Curzan, Anne. 2000. Gender categories in early English grammars: Their message to the modern grammarian. In Barbara Unterbeck, Matti Rissanen, Terttu Nevalainen & Mirja Saari (eds.), *Gender in grammar and cognition*, 561–76. Berlin: Mouton de Gruyter.
- Curzan, Anne. 2003. *Gender shifts in the history of English*. Cambridge, UK: Cambridge University Press.
- Frawley, William. 1992. *Linguistic semantics*. Hillsdale, NJ: Lawrence Erlbaum.
- Graband, Gerhard. 1965. *Die Entwicklung der frühneuenglischen Nominalflexion*. Tübingen: Max Niemeyer.
- Grund, Peter. 2003. The golden formulas: Genre conventions of alchemical recipes in the Middle English period. *Neophilologische Mitteilungen* 104(4): 455–75.
- Grund, Peter. 2006a. Manuscripts as sources for linguistic research: A methodological case study based on the *Mirror of Lights*. *Journal of English Linguistics* 34(2): 105–25.
- Grund, Peter. 2006b. 'ffor to make Azure as Albert biddes': Medieval English alchemical writings in the pseudo-Albertan tradition. *Ambix* 53(1): 21–42.
- Grund, Peter. 2009. "Textual alchemy: The transformation of Pseudo-Albertus Magnus's *Semita recta* into the *Mirror of Lights*. *Ambix* 56(3): 202–25.

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

Grund, Peter (ed.) Forthcoming. "*Misticall Wordes and Names Infinite*": An edition and study of *Humfrey Lock's treatise on alchemy*. Medieval and Renaissance Texts and Studies 367. Tempeh, AZ: Arizona Center for Medieval and Renaissance Studies, Arizona State University.

Halversen, Marguerite A. (ed.) 1998. *The Consideration of Quintessence*: An edition of a Middle English translation of John of Rupescissa's *Liber de consideratione de quintae essentiae* [sic] *omnium rerum* with introduction, notes, and commentary. East Lansing, MI: Michigan State University Ph.D. dissertation.

Heltveit, Trygve. 1958. Attribute and anaphora in the gender system of English. *Norsk Tidsskrift for Sprogvidenskap* 18: 357–69.

Holmyard, E. J. 1990 [1957]. *Alchemy*. New York: Dover. Reprint.

Ihalainen, Ossi. 1985. Synchronic variation and linguistic change: Evidence from British English dialects. In Roger Eaton, Olga Fischer, Willem Koopman & Frederike van der Leek (eds.), *Papers from the 4th International Conference on English Historical Linguistics*, 61–72. Amsterdam: John Benjamins.

Jones, Charles. 1988. *Grammatical gender in English: 950–1250*. London: Croom Helm.

Karras, Ruth Mazo. 2003. *From boys to men: Formations of masculinity in late medieval Europe*. Philadelphia: University of Pennsylvania Press.

Keiser, George R. 1998. *A manual of the writings in Middle English 1050–1500*, vol. X, *Works of science and information*. New Haven, CT: The Connecticut Academy of Arts and Sciences.

Kytö, Merja, Mats Rydén & Erik Smitterberg (eds.) 2006. *Nineteenth-century English: Stability and change*. Cambridge, UK: Cambridge University Press.

- Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)
- Lass, Roger. 1992. Phonology and morphology. In Norman Blake (ed.), *The Cambridge history of the English language*, vol. 2, 1066–1476, 23–155. Cambridge, UK: Cambridge University Press.
- Lyons, John. 1977. *Semantics*. 2 vols. Cambridge, UK: Cambridge University Press.
- MacKay, Donald G. & Toshi Konishi. 1980. Personification and the pronoun problem. *Women's Studies International Quarterly* 3: 149–63.
- Mathiot, Madeleine. 1979. Sex roles as revealed through referential gender in American English. In Madeleine Mathiot (ed.), *Ethnolinguistics: Boas, Sapir and Whorf revisited*, 1–47. The Hague: Mouton.
- Mausch, Hanna. 1986. A note on LME gender. *Studia Anglica Posnaniensia* 18: 89–100.
- Moore, Samuel. 1921. Grammatical and natural gender in Middle English. *Publications of the Modern Language Association* 36: 79–103.
- Morsbach, Lorenz. 1926. *Grammatisches und psychologisches Geschlecht im Englischen*. 2nd edn. Berlin: Weidmannsche Buchhandlung.
- Mustanoja, Tauno F. 1960. *A Middle English syntax. Part I: Parts of speech*. Helsinki: Société Néophilologique.
- Nevalainen, Terttu & Helena Raumolin-Brunberg. 1994. *Its strength and the beauty of it: The standardization of the third person neuter possessive in Early Modern English*. In Dieter Stein and Ingrid Tieken-Boon van Ostade (eds.), *Towards a standard English 1600–1800*, 171–216. Berlin: Mouton de Gruyter.
- OED = The Oxford English Dictionary*. Available at www.dictionary.oed.com. (As accessed in 2008.)

- Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)
- Pawley, Andrew. 2002. Using *he* and *she* for inanimate referents in English: Questions of grammar and world view. In N. J. Enfield (ed.), *Ethnosyntax: Explorations in grammar and culture*, 110–37. Oxford: Oxford University Press.
- Quirk, Randolph, Sidney Greenbaum, Geoffrey Leech & Jan Svartvik. 1985. *A comprehensive grammar of the English language*. Harlow: Longman.
- Roberts, Gareth. 1994. *The mirror of alchemy: Alchemical ideas and images in manuscripts and books from antiquity to the seventeenth century*. London: The British Library.
- Saeed, John I. 2003. *Semantics*. 2nd edn. Oxford: Blackwell.
- Siemund, Peter. 2008. *Pronominal gender in English: A study of English varieties from a cross-linguistic perspective*. New York & London: Routledge.
- Stenroos, Merja. 2008. Order out of chaos? The English gender change in the Southwest Midlands as a process of semantically based reorganization. *English Language and Linguistics* 12(3): 445–73.
- Svartengren, T. Hilding. 1927. The feminine gender for inanimate things in Anglo-American. *American Speech* 3: 83–113.
- Svartengren, T. Hilding. 1928. The use of the personal gender for inanimate things. *Dialect Notes* 6: 7–56.
- Taavitsainen, Irma & Päivi Pahta (eds.) 2004. *Medical and scientific writing in late medieval English*. Cambridge, UK: Cambridge University Press.
- Taavitsainen, Irma, Päivi Pahta & Martti Mäkinen (eds.) 2005. *Middle English Medical texts*. CD-ROM. Amsterdam: John Benjamins.
- Voigts, Linda E. & Patricia D. Kurtz. 2000. *Scientific and medical writings in Old and Middle English: An electronic reference* (CD-ROM). Ann Arbor, MI: University of Michigan Press. [Updated version, eVK2, found at <http://cctr1.umkc.edu/cgi-bin/search>]

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

Wales, Katie. 1996. *Personal pronouns in Present-Day English*. Cambridge, UK: Cambridge University Press.

Wales, Katie. 2009. Review of Peter Siemund. 2008. *Pronominal gender in English: A study of English varieties from a cross-linguistic perspective*. New York & London: Routledge. *English Language and Linguistics* 13(3): 508–10.

Welna, Jerzy. 1980. On gender change in linguistic borrowing (Old English). In Jacek Fisiak (ed.), *Historical morphology*, 399–420. The Hague: Mouton.

Yamamoto, Mutsumi. 1999. *Animacy and reference: A cognitive approach to corpus linguistics*. Amsterdam: John Benjamins.

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

TABLE 1

He and It in Alchemical Texts

Text	<i>He</i>	<i>It</i>	TOTAL
<i>Mirror of Lights</i>	15 (10%)	135 (90%)	150 (100%)
<i>Recipes</i> (Corpus Christi College, Oxford, MS 226)	28 (12.5%)	196 (87.5%)	224 (100%)
<i>Scoller and Master</i>	10 (59%)	7 (41%)	17 (100%)
<i>The Consideration of the Quintessence</i>	18 (15%)	105 (85%)	123 (100%)
<i>Recipes</i> (Halversen 1998)	10 (12%)	74 (88%)	84 (100%)
<i>Recipes</i> (Trinity College, Cambridge, MS R. 14. 37)	14 (40%)	21 (60%)	35 (100%)
TOTAL	95 (15%)	538 (85%)	633 (100%)

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

TABLE 2

Antecedents

Antecedent	<i>He</i>	<i>It</i>	TOTAL
Antimony	1	–	1
Arsenic	3	10	13
Atrament	2	2	4
Blood/Lapis/Stone	1	1	2
Body	2	1	3
Element	1	–	1
Flower, Flower of Bras, of Copper/ of Atrament, of Tartar, of Lead, of Vermilion, of Vitriol	3	14	17
Gold	4	10	14
Heaven (= quintessence)	4	9	13
Matter	3	9	12
Medicine	2	5	7
Mercury	16	18	34
Metal	2	18	20
Plate/Venus (= copper)	3	–	3
Pot	1	9	10
Powder	1	7	8
Quintessence	7	25	32
Sal Alkali	2	6	8
Sal Ammoniac	7	4	11

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

Salt, Common Salt, Sal Common	2	10	12
Stone, White Stone	2	5	7
Sulfur, Sulfur Vive	7	8	15
Sun (= gold)	3	3	6
Tin	2	4	6
Water, Water of Mercury	1	28	29
Aes ustum (= burned copper), Alembic, Alum, Amalgam, Anima Saturni (unidentified substance), Aqua Ardent, Aqua Vitae, Azure, Calce, Calce of Silver, Calce of Gold, Covering, Drop, Earth (= a solid substance), Elixir, Fatness of Sulfur, Fire, Glass, Piece of Glass, Ingot, Iron (= type of receptacle), Lead, Licour (= a liquid), Limail of Copper, Limail of Iron (= copper or iron filings), Lune (= silver), Lye, Oil, Orpiment, Pan, (Oleum) Plumb, (Philosopher's) Plumb, Quicksilver, Sal Artificial, Saturn (= lead), Silver, Sol (= gold), Spirit (= volatile substance), Spirit of Quintessence, Stillatory Head, Tartar, Thing, Vermilion, Vessel, Vineger, Vitriol, Green Vitriol, Wine	–	100	100
Unclear/Indeterminate	13	232	245
TOTAL	95	538	633

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

TABLE 3

Influence from the Preceding Forms *He* and *It* (Subject Form)

	<i>He</i>	<i>It</i>	TOTAL
Preceded by <i>he</i>	26 (87%)	4 (13%)	30 (100%)
Preceded by <i>it</i> (subject form)	4 (4%)	89 (96%)	93 (100%)
No subject pronoun in near context	65 (13%)	445 (87%)	510 (100%)
TOTAL	95	538	633 (100%)

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

TABLE 4

Influence from the Preceding Forms *Him/Himself/His* and *It* (Object or Prepositional Object)/*Itself*

	<i>He</i>	<i>It</i>	TOTAL
Preceded by <i>him, himself, or his</i>	27 (61%)	17 (39%)	44 (100%)
Preceded by <i>it</i> (as object and prepositional object), or <i>itself</i>	4 (2%)	185 (98%)	189 (100%)
No object, reflexive, or possessive pronoun in near context	34 (12%)	243 (88%)	277 (100%)
TOTAL	65	445	510 (100%)

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

TABLE 5

Influence from the Preceding Forms *He/Him/Himself/His* and *It* (Subject, Object, or Prepositional Object)/*Itself*

	<i>He</i>	<i>It</i>	TOTAL
Preceded by <i>he, him, himself, or his</i>	53 (72%)	21(28%)	74 (100%)
Preceded by <i>it</i> (as subject, object, and prepositional object), or <i>itself</i>	8 (3%)	274 (97%)	282 (100%)
No subject, object, possessive or reflexive pronoun in near context	34 (12%)	243 (88%)	277 (100%)
TOTAL	95	538	633 (100%)

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

TABLE 6

Active and Passive Constructions with *He* and *It*

Construction	<i>He</i> (all examples)	<i>It</i> (all examples)	TOTAL	<i>He</i> (excl. copulas and intransitives)	<i>It</i> (excl. copulas and intransitives)	TOTAL
Active	81 (16%)	420 (84%)	501 (100%)	30 (30%)	71 (70%)	101 (100%)
Passive	14 (11%)	117 (89%)	131 (100%)	14 (11%)	117 (89%)	131 (100%)
Unclear	--	1 (<1%)	1 (100%)	--	1 (<1%)	1 (100%)
TOTAL	95	538	633	44	189	233

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

TABLE 7

Complementation Patterns

Verb Usage	<i>He</i>	<i>It</i>
Transitive	44 (46%)	188 (35%)
Intransitive	17 (18%)	144 (27%)
Copula	34 (36%)	203 (38%)
Unclear	--	3 (1%)
TOTAL	95 (100%)	538 (≈100%)

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

TABLE 8

Semantic Verb Categories (excluding unclear example, examples of copulas, and the complex-transitive example)

Verb Categories	He	It
Activity & Action (e.g. <i>cover</i>)	28 (46%)	88 (27%)
Process (e.g. <i>dissolve</i>)	19 (31%)	183 (55%)
Motion (e.g. <i>go</i>)	7 (11%)	28 (8%)
Human emotion & endeavor (e.g. <i>hate</i>)	4 (7%)	2 (1%)
Naming (e.g. <i>call</i>)	--	10 (3%)
Appearance (e.g. <i>show</i>)	1 (2%)	4 (1%)
Stativity (e.g. <i>stand</i>)	1 (2%)	8 (2%)
Other	1 (2%)	8 (2%)
TOTAL	61 (≈100%)	331 (≈100%)

Peter Grund. 2011. "The Science of Pronominal Usage: He and It in Co-Reference to Inanimate Objects in Late Middle English Texts on Alchemy." *Journal of English Linguistics* 39(4): 335–358. (accepted manuscript version, post-peer review)

Peter Grund is Assistant Professor of English Language Studies in the English Department, University of Kansas. He is associate editor of *Records of the Salem Witch-Hunt* (Cambridge University Press, 2009). He has two books forthcoming in 2011: "*Misticall Wordes and Names Infinite*": *An Edition and Study of Humfrey Lock's Treatise on Alchemy* (Arizona Center for Medieval and Renaissance Studies), and *English Witness Depositons 1560–1760: An Electronic Text Edition* (John Benjamins; with Merja Kytö and Terry Walker).