Title: The transition from *abortion* to *miscarriage* to describe early pregnancy loss in British medical journals: a prescribed or natural lexical change?

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The transition from *abortion* to *miscarriage* to describe early pregnancy loss in British medical journals: a prescribed or natural lexical change?

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Abstract

In British medical research, the transition from *abortion* to *miscarriage*, to describe early pregnancy loss, occurred in the late twentieth century. A 1985 letter to *The Lancet* by a group of eminent obstetricians was long considered unilaterally to have prompted this shift. More recently, however, this conclusion was challenged, and it was suggested instead that the transition constituted natural language change, as medical professionals responded to their changing social and professional milieu. This paper, however, uses a pioneering statistical modelling technique to demonstrate decisively that the 1985 *Lancet* letter was indeed pivotal in promoting *miscarriage* as an acceptable variant for use in medical journals.

The abrupt nature of the vocabulary shift in question is made clear through the pioneering application of the statistical modelling technique change point analysis. This methodological innovation demonstrates clearly the decisive impact of the 1985 letter, whilst also showcasing the remarkable suitability of change point analysis to the study of such sudden linguistic changes.

With an increasing emphasis on patient-centred models of care, it is likely that further prescriptive interventions relating to medical language will be made in coming years. Indeed, beyond the medical profession, there are already increasing calls for further reform to the language of pregnancy loss. To understand how such language reforms might successfully be enacted, and to ensure that linguistic prescriptivism is employed only where change is appropriate, proportionate, and evidence-based, it is necessary to understand fully this historical precedent. Against the backdrop of recent 'lay' demands for reforms, this paper affirms the decisive impact of the 1985 intervention, and considers the ramifications of this finding for the study of linguistic prescriptivism and future medical language reform.

1. Introduction

In 1985, a letter published in *The Lancet* raised a linguistic issue with the medical English used in clinical settings in Britain. This problem, according to the authors of this letter, was that "no clear distinction is made between a spontaneous and an induced expulsion of the contents of the uterus in

early pregnancy" (Beard et al. 1985). Its authors were a group of eminent specialists in obstetrics and gynaecology at St Mary's Hospital in London, where a specialist clinic for those experiencing recurrent miscarriage had been established three years earlier. Professor Beard and his colleagues go on to describe a state of affairs whereby medical professionals "use the word 'abortion' regardless of whether it was a spontaneous or induced event", whereas "patients always speak of 'miscarriages' unless they have had a termination of pregnancy" (1985, 1122). In addition to emphasising the potential for confusion resulting from this disparity, Beard et al. (1985) also describe the psychological impact which the use of *abortion* causes in the event of spontaneous loss. Of their patients in the recurrent miscarriage clinic at St Mary's, they write that "it is remarkable how uncomplaining these women are, but one constant comment they make is how deeply offended they are by the use of the word abortion to describe their condition" (1123). Their letter also cites a Miscarriage Association survey, which found that 85% of respondents felt *abortion* should not be used in this way. (1123). Indeed, such is the perceived distress caused by *abortion* that Beard et al. urge all health professionals "to start using the word miscarriage rather than abortion for a spontaneous pregnancy loss before 28 weeks of pregnancy", claiming to make this appeal "on *humanitarian* grounds" (1985, 1123; emphasis added).

Within a decade, in professional circles at least, Beard et al.'s (1985) intervention was being acknowledged as highly influential. Seven years later, in 1992, psychologist Beverly Chalmers opined that "publications in the British Journal of Obstetrics and Gynaecology have taken heed"; noting "a change in terminology used before and after" the publication of the letter in 1985 (Chalmers, 1992, 357). Likewise, writing in a *British Medical Journal* editorial in 1997, Emeritus Professor of Obstetrics Geoffrey Chamberlain referred to the "substitution of the term miscarriage for abortion catalysed by Beard et al." (Chamberlain, 1997, 1684)

In recent years, however, the impact of Beard et al.'s (1985) intervention has been questioned. In a 2013 paper published in *Medical Humanities,* Andrew Moscrop placed the *Lancet* letter in its sociohistorical context; presenting it as one factor amongst many which drove the transition from *abortion* to *miscarriage* to describe early pregnancy loss at the end of the last century. According to Moscrop, this was (to paraphrase his conclusions in linguistic terms) a natural language change which arose as language users responded to a changing social and professional milieu (2013, 98).

The central linguistic question arising from this debate is therefore whether the shift from *abortion* to *miscarriage,* as the predominant variant in this context, is a natural or prescribed language change. If we were able to conclude that Beard et al.'s (1985) intervention had proven decisive in encouraging others writing in medical journals to change their usage, this would be a prescribed change, and not a natural one. This is because in linguistics, prescriptivism is the imposition (or attempted imposition) of one linguistic variant over another (Curzan, 2014: 3). Historically, the imposition of variants in this way in English has tended to result from rules or judgments intended to promote and enforce language

standardization, and has thus been closely associated with rigid social hierarchies and regarded as obstructive to social mobility. This type of prescriptivism is closely associated in the British consciousness with grammar books and style guides, and has traditionally been reinforced through formal education and the media. As prescriptivism expert Anne Curzan has outlined, however, this is not the only type of prescriptive agenda. So-called "politically responsive" prescriptivism imposes rules or judgments with the intention of promoting inclusive, non-discriminatory, or politically sensitive language (Curzan, 2014, 38).

Whether the impact of linguistic prescriptivism on language usage can be measured quantitatively is subject to ongoing debate (c.f. Auer & González-Díaz, 2005; Yáñez-Bouza, 2008; Anderwald, 2014, 2019). It has, however, recently been demonstrated that a statistical technique known as change point analysis can be utilized in contexts where prescriptivism has prompted a sudden change in usage which humans might not be able to detect by eye (Malory, 2021). As will be outlined in detail below, change point analysis detects abrupt changes in sequential data. In statistical terms, therefore, a change point can be said to exist when a data series follows one distribution up to that point, and another distribution thereafter. Change point analysis therefore both provides evidence as to whether a change has occurred, and locates any chance that is detected. Classic studies which inaugurated the use of change point analysis tested pre-existing hypotheses (c.f. Maguire, 1952; Jarrett, 1979), and that is also the model that will be employed here. Our starting point is the hypothesis that Beard et al. (1985) might, as was presumed during the 1990s (Chalmers, 1992; Chamberlain, 1997), have brought about a rapid shift in usage away from *abortion* and towards *miscarriage* in British medical English. This hypothesis will be tested on medical journal data from the 1970s, 1980s, and 1990s, using a purpose-built change point model (see Appendix A). Any change point found to correspond with the publication of Beard et al. (1985) can be considered to provide evidence of a causal link.

2. Literature Review: Calls for change

Using change point analysis to generate fresh evidence will allow the re-evaluation of the role which Beard et al. (1985) played in the lexical shift from *abortion* to *miscarriage* in medical journals. The application of change point analysis to diachronic language change and prescriptive impact is innovative. It will give insight into the mechanisms by which prescriptivism can catalyse or accelerate language change; a process about which knowledge remains surprisingly scant. The issues covered by this paper are not of purely academic interest, however, but rather have significant real-world ramifications. In recent years, there have been growing calls for further reform to the language used in relation to pregnancy loss (see, for example, Gorfinkel, 2015; Oré, 2020). It seems that we are again encountering the kind of widespread patient dissatisfaction which, it seems, prompted Beard et al. (1985) to endorse *miscarriage* as a more appropriate variant than *abortion* for discussion of loss in

clinical settings. These calls, however, do not seem to have had any impact on usage. Reconsidering the lexical success story of *miscarriage*, and exploring Beard et al.'s (1985) role in promoting it, could begin to explain why more recent calls for reform seem to have had so little impact.

The most obvious difference between the state of affairs in the 1980s and the 2010s is that, in Beard et al. (1985) *miscarriage* had a group of eminent proponents within the medical profession in Britain. By comparison, more recent expressions of dissatisfaction with the language available for use in this context have mostly come from outside the medical profession, and from outside the UK (c.f. Gorfinkel, 2015; Oré, 2020). It is perhaps surprising, given that Beard et al. (1985) frame the transition from *abortion* to *miscarriage* as patient-led, that recent calls have also mostly taken issue with the very word that letter endorsed: *miscarriage*. In Britain, at least, such recent criticisms do not appear to constitute a cohesive movement, spearheaded by a group of eminent clinicians and published in a prestigious journal, as Beard et al.'s (1985) criticisms were. Instead, they seem primarily to take the form of individual patients using social media to express dissatisfaction, and attracting little attention either from traditional media or the medical profession (c.f. Oré, 2020).

In North America, site of other anglophone western cultures with similar vocabularies for discussing pregnancy loss, the situation is slightly different. Here, a commentary paper was published in 2011 in the American College of Obstetrics and Gynecology's journal *Obstetrics and Gynecology*, which advocated reform to 'Nomenclature for Pregnancy Outcomes' (Silver et al., 2011). Here, as Beard et al. had done in 1985, Silver et al. argued that the label *spontaneous abortion* for "all pregnancy losses before the mid-second trimester" is "arbitrary, outdated, and not clinically useful" (2011, 1402). Silver et al. focus primarily on outlining why the conventional vocabulary in this domain is, to use their words, "not clinically useful"; but do also dedicate a section to "emotional considerations" and the psychological impact of what they term "culturally insensitive" language (2011, 1405).

Silver et al.'s (2011) paper also raises important issues relating to the projection of culpability onto the maternal body. According to Silver et al., "[r]eference to pre-embryonic pregnancy losses as blighted ova…makes no biological sense and conveys a sense of the loss being due to some inherent abnormality with the mother" (2011, 1407). The same, the authors note, "is true for cervical incompetence or cervical insufficiency", which likewise "places 'blame' on the mother and leads to emotional distress" [sic] (Silver et al., 2011, 1407). Ultimately, Silver et al. (2011) provide a table which delineates conventional terminology and proposed alternatives, such as *early pregnancy loss* instead of *spontaneous abortion* (1406). The authors urge "organizations of obstetricians, gynecologists, reproductive endocrine and infertility specialists, neonatologists, epidemiologists, and reproductive biologists to organize workshops, participate in discussions, and develop position statements and publications to facilitate consensus and widespread adoption of alternative nomenclature." (Silver et al., 2011, 1407).

Such criticism of the linguistic status quo within publications associated with the medical establishment seems to remain exceptional. There have, however, also been calls for reform in the mainstream media in North America over the last decade. In 2015, when Canadian GP Iris Gorfinkel published an article entitled 'It's time to stop calling pregnancy loss "miscarriage"', it did not appear in a medical journal, but in Canadian newspaper *The Globe and Mail* (Gorfinkel, 2015). There has also been a tendency for discussion of this issue to be confined to publications written for (and usually by) women. In 2020, for example, the women's magazine *Glamour* published an article on their US website entitled 'Women Are Calling for the Word Miscarriage to Be Banished For Good' [sic] (Oré, 2020). This piece reported on popular calls on anglophone social media for language reform in this domain, after American model Chrissy Teigen announced that she had lost her son Jack at 20 weeks pregnant. The piece quotes such calls from North America and the UK.

It is, perhaps, ironic that *miscarriage*, the term endorsed so strongly by Beard et al. (1985) "on humanitarian grounds" should, less than 40 years later, be the subject of such criticism. It is also notable that, outside the UK, such criticism seems to exist in both professional medical contexts and beyond. In the UK, by comparison, little consideration seems to have been given to the language used in relation to pregnancy loss in recent decades. One notable exception to this is the production of so-called "consensus statements" on language used in clinical settings. These tend to be collaborative documents which are created following consultation between colleagues working within clinical settings. 'Terminology for pregnancy loss prior to viability: a consensus statement from the ESHRE early pregnancy special interest group' (Kolte et al. 2015) was for instance, produced by a team of clinicians, some of whom also have research portfolios. The production of the 'UK consensus guidelines for the delivery of unexpected news in obstetric ultrasound' (Johnson et al. 2020) drew from a slightly broader church. These guidelines emerged from a collaborative process involving sonographers, midwives, an obstetrician, five academics, three "lay experts", policy experts, and representatives from relevant third-sector organisations (Johnson et al. 2020, 237).

The Kolte et al. (2015) consensus statement is not focused on improving communication sensitivity, but rather reducing the "difficult[y of] compar[ing] study results from different centres" (495). Unlike in Beard et al. (1985) and Silver et al. (2011), therefore, patient preference enters only obliquely into the authors' consideration of how language should be used. In Johnson et al.'s (2020) guidelines for delivery of unexpected news in obstetric ultrasound, sensitivity is foregrounded to a much greater extent. As Silver et al. (2011) did, Johnson et al. (2020), use tables to recommend the use or abandonment of different words and phrases, depending on their sensitivity, clarity, and perceived appropriacy.

From this review, it should be clear that relatively little attention has been paid to the vocabulary used in relation to pregnancy loss since the 1980s. The few, apparently disparate, consensus documents and

articles recommending language reform which do exist all have one thing in common. Whether produced in the 1980s or 2020, whether focused on sensitivity to patient experience or not, they all lack any basis in systematic, empirical research on language usage or attitudes. Without exception, they all also use phrases which generalize, such as "patients prefer" (Beard et al. 1985; Kolte et al. 2015), refer to "preferred" variants (Johnson et al. 2020), or to the emotional responses, such as "anger and sometimes frustration" (Silver et al. 2011) which conventional vocabulary elicits from the bereaved. These are, however, statements based on the perceptions of the authors, which will inevitably be limited by the scope of their experiences, their subjective perspective, and their own personal biases. These are, therefore, anecdotal observations, ascertained unscientifically. They make presumptions about patient preference, without actually asking a large sample of affected people. The closest such documents seem to come to empirical evidence is the use of the Miscarriage Association survey from the early 1980s, which is quoted in Beard et al. (1985), and is now almost forty years out of date.

It seems probable that clinicians highlighting patient dissatisfaction with the language around pregnancy loss, whether in 1985 or 2020, are individuals earnestly reflecting what their patients are communicating to them. Such micro-level patient dissatisfaction may well be reflected at a macro level, in an appetite for language reform. The total lack of recent empirical data on this subject, however, makes this impossible to judge.

Gathering such data and drawing conclusions on the appetite for reform is the job of another paper. Against a backdrop of calls in anglophone cultures for further reforms, though, however sporadic or muted those may be, it is necessary to ascertain once and for all what prompted such a decisive shift from *abortion* to *miscarriage* in medical British English in the late twentieth century. What was it that gave *miscarriage*, a variant that had been used in vernacular contexts for centuries, the critical mass of support that it needed to enter the British medical lexicon, when medical registers are known to be particularly resistant to linguistic change (Biber and Finegan, 1997)? Is it perhaps that the endorsement of eminent clinicians in the field is a prerequisite for medical vocabulary reform to succeed? Does such endorsement require the accompaniment of sustained patient pressure, over a long period?

It is only by examining the abandonment of *abortion* and the ascendance of *miscarriage* in British medical English that we can begin to answer these questions. With an increasing emphasis on the importance of patient-centred models of care (c.f. Bleakley, 2015; Buetow, 2016), it is likely that further prescriptive interventions relating to clinical language, of the kind made by Beard et al. (1985) and Silver et al. (2011), will be made in coming years. The first step in assessing how such medical language reforms might successfully be enacted, and how we can ensure that such prescriptivism is only employed where a change is appropriate, proportionate, and evidence-based, is to consider the progress of those already implemented. This paper will do so for the impact of Beard et al.'s (1985) *Lancet* letter.

3. Context: A change in progress?

By the early 1990s, it seems to have been accepted that Beard et al.'s (1985) 'Miscarriage or Abortion?' *Lancet* letter was having an appreciable impact on medical usage. In her 1992 study of usage in the *British Journal of Obstetrics and Gynaecology*, Beverly Chalmers asserted that researchers had "taken heed" of Beard et al.'s enjoinder (357). She presented data demonstrating a "change in terminology used before and after" the *Lancet* letter was published in 1985 (357).

Likewise, writing in the *British Medical Journal* (*BMJ*) in 1997, Emeritus Professor of Obstetrics Geoffrey Chamberlain referred to the "substitution of the term *miscarriage* for *abortion* catalysed by Beard et al." (1684). In study conducted in 2013 and reported in *Medical Humanities*, however, GP Andrew Moscrop disagreed with Chalmers' (1992) and Chamberlain's (1997) findings. Moscrop concluded that Beard et al. (1985) merely expressed a sentiment that was, by the mid-1980s, growing in popularity among specialists in obstetrics and gynaecology. In linguistic terms, Moscrop therefore presents the shift from *abortion* to *miscarriage* as a natural change which the language in this register was undergoing in response to the seismic "legal, technical, professional and social developments" (2013, 101) of the late twentieth century, and reflecting a change in society at large. Moscrop (2013) thus concludes that Beard et al.'s (1985) *Lancet* letter had the effect of hastening a change in progress, rather than proactively enacting reform per se.

Against the backdrop of the social and medical developments which occurred between the 1960s and 1990s, which Moscrop (2013) describes, this seems a highly plausible hypothesis. The legalization of pregnancy termination following the 1967 Abortion Act is, of course, particularly relevant to the question of how the transition from *abortion* to *miscarriage* in the context of early pregnancy loss came about. Moscrop (2013) points out that prior to 1967, the distinction between "spontaneous" and "induced" abortion was essentially academic; since those who had undergone illegal termination of pregnancy were unlikely to incriminate themselves by revealing this in a clinical setting (99). He quotes several *BMJ* articles from the early 1960s which make reference to the suspicion of widespread "criminal interference" (2013, 100). Moscrop concludes that, as a result, "the distinction between 'abortion' and 'miscarriage' was impossible in clinical practice and meaningless in clinical language" (2013, 100).

Advances in the capabilities and availability of ultrasound technology during the 1970s and 1980s are also pertinent here. Ultrasonography enabled clinicians to diagnose various causes of early pregnancy bleeding which had previously been discernible only in retrospect, following the spontaneous expulsion or surgical removal of the contents of the uterus, or death of the pregnant patient. Strikingly, Moscrop notes that prior to the advent of sophisticated ultrasonic diagnostic capabilities, "[u]ltimate diagnostic knowledge was as likely to be obtained by the hospital pathologist as by the clinician" (2013, 100). Moreover, as Moscrop also points out, ultrasound technology also played a role in the development of

perinatology as a specialist subdiscipline during the same period. This kind of professional specialization is often associated with the development of a specialist lexicon.

It must also be acknowledged that the late twentieth century witnessed significant societal developments which may have played a role in driving the transition from the clinical descriptor *abortion* to the vernacular *miscarriage* as the prevailing lexical variant. The Women's Liberation movement of the 1960s and 1970s resulted in the articulation of women's experiences in the public sphere to an unprecedented degree. Phenomena previously marginalized and stigmatized as 'women's issues' were foregrounded in the public consciousness for the first time, as women enjoyed unprecedented freedom of expression. Whilst we must be wary of overemphasizing the strides towards equality that were made during this period, as the long shadows cast by historical taboos around women's reproductive health still linger, we must recognise that significant advances were made during this period.

As regards the new "woman-centred approach" which ensued from increased representation of women in the public sphere, Moscrop (2013) highlights two developments of particular relevance to the vocabulary of early pregnancy loss; both of which occurred in the early 1980s. The first, in 1982, was the establishment of the Miscarriage Association, a charity founded to support and advocate for those experiencing miscarriage. Its name, today unchanged since the 1980s, remains a clear indication of its founders' preference for *miscarriage* over *abortion*. Likewise, in 1984, the first British book intended to inform a general readership about pregnancy loss was published by two sociologists and a GP, entitled *Miscarriage*. If its title was not enough of a clue as to its authors' allegiance in the *abortion*/*miscarriage* debate, Oakley et al. also state explicitly their preference for *miscarriage* over the variant then still prevailing in clinical settings: *abortion* (cited in Chalmers, 1992, 357). To Moscrop's (2013) list, we must also add the establishment of the recurrent miscarriage clinic at St Mary's Hospital, London in 1982.

In light of all these developments, it is tempting to attribute the transition from *abortion* to *miscarriage* to natural language change. We could easily dismiss it as a change which came about when the language bowed, as languages are wont to do, to the pressure of popular usage. However, whilst there is no doubt that the ingredients for vocabulary change were present, it is still vital that we ascertain the precise role Beard et al.'s (1985) *Lancet* letter played in bringing about this change in the specific context of British medical journals. It is only by doing so that we can begin to understand the mechanisms by which medical language reforms for the benefit of patients can be enacted successfully.

4. Data and Method

The methodology employed in this paper is, broadly speaking, corpus linguistic. Corpus linguistics is a subdiscipline of the study of language which uses automated methods to investigate how language is

used in reality. In practice, this means surveying the 'real-life' use of language in a computerized database or corpus (plural, 'corpora'). Nowadays, corpora can often comprise millions or even billions of words of textual data, but special-purpose corpora, those built with a specific research remit in mind, are often much smaller than this.

The present study utilized a small corpus of article titles from three influential British medical journals during the period 1975-1995. This corpus was maximally representative, containing all article titles appearing in *The Lancet* (n=314)*, British Medical Journal* (*BMJ*, n=355) and *British Journal of Obstetrics and Gynaecology* (*BJOG*, n=172) between 1975 and 1995 which referred to pregnancy ending in any way except through the birth of a live child or through stillbirth.

The rationale for considering only article titles and not articles in their entirety was that titles alone were enough to determine authors' ultimate preference for *abortion* or *miscarriage* in the context of early pregnancy loss. Indeed, the occurrence of additional instances of either variant in a given article could have skewed the results. For example, the results could have been prejudiced if a particularly long article used one variant more than a shorter article using the other variant, or if an author used their preferred variant with disproportionate frequency by comparison with the habits of other authors. Article titles were sufficient to determine which variant the author preferred, and were therefore all that was required for the corpus to be compiled. It should be noted here that both variants appeared in one article title in the corpus. In this case, both were recorded in the frequency count for the year in which that article was published.

The three journals included in the study, the *Lancet*, the *British Medical Journal* (*BMJ*) and *British Journal of Obstetrics and Gynaecology* (*BJOG),* were selected as the publications which have previously been studied in relation to this issue. Beverly Chalmers' (1992) study of *abortion* and *miscarriage* usage, mentioned above, considered articles in the *BJOG,* whilst Andrew Moscrop's (2013) study considered the three journals also used here. Though this study does not seek to emulate precisely the methodology of either of these studies, the inclusion of these publications in previous studies is indicative of their standing and eminence in relation to obstetrics and gynaecology research in Britain, during the study period.

For each of these three publications and for each year between 1975 and 1995, a frequency count of *abortion* and *miscarriage* in article titles was conducted. Any instance of *abortion* in the context of termination of pregnancy was discarded. Any instance of *miscarriage* occurring in any context other than spontaneous pregnancy loss would likewise have been discarded, though none arose. The resulting totals are tabulated in Table 1.

Publication	Titles using *abortion* (in context of spontaneous loss)	Titles using *miscarriage*
British Journal of Obstetrics and Gynaecology (*BJOG*)	37	42
British Medical Journal	49	25
Lancet	61	18

Table 1. Number of article titles containing *abortion* in the context of spontaneous loss, or *miscarriage*.

The data for the three publications were then subjected to change point analysis. As noted above, this is a statistical method for identifying changes in sequential data. In statistical terms, a change point is said to exist when observations follow one distribution up to that point, and follow another distribution thereafter. For example, a change point would be identified if something occurred once every two years before a certain point, and once every two months thereafter. The purpose of change point analysis is twofold; firstly, to detect whether any change occurs, and secondly to locate any change point.

The earliest change point studies date from the 1950s (Chen and Gupta 2013, vii), but in the intervening decades the method has been applied to a wide variety of disciplines and has the potential for enormous impact. Chen and Gupta (2013) note that change point analysis has been used in "economics, finance, medicine, psychology, geology [and] literature" (vii), whilst Brodsky and Darkhovsky (1993) write that "[w]hether it is an EEG analysis which is involved, a seismogram, or data from an orbiting satellite, whether a historical text or a manuscript is the subject of our investigation…we are dealing with the results of observations that form a random sequence" (vii). Regardless of the data in question, then, providing that observations can be considered statistically random, the application of change point analysis remains essentially the same.

The classic model of change point study sets out to test a pre-existing hypothesis as to where a change point is expected to occur. This model was inaugurated by Maguire et al. (1952), in a study updated by Jarrett (1979) and Rafferty and Akman (1986) which evaluated the efficacy of new mine safety legislation. Correlation between a change point in the number of mining disasters (defined as incidents involving 10 or more fatalities) and a significant change in the coal industry was considered indicative of a causal link. This study will follow a similar model; setting out to test whether the year during which the *Lancet* letter written by Beard et al. was published, 1985, constitutes a statistical change point for use of *miscarriage* and *abortion* in the titles of medical research papers. This would strongly indicate that Beard et al.'s (1985) letter had a prescriptive impact on usage amongst clinicians publishing research in British medical journals; whereas a more gradual change would be more typical of natural language change.

In order to test the hypothesized change point of 1985, a purpose-built change point model, implemented in Python, has been used to analyse the frequency with which *abortion* and *miscarriage* appear in article titles from the *Lancet*, *BMJ*, and *BJOG* during the study period. This methodology is similar to that used in another recent study (Malory, 2021) in which the variants studied were grammatically paradigmatic, and therefore mutually exclusive. In this instance, the variants can likewise be regarded as essentially mutually exclusive, since no other established means of referring to early pregnancy loss seems to have been available in British English medical lexis during the study period. In each instance, then, the author (or editor, since it remains unclear whether any of the journals issued guidance on variation in this context during the study period) has a choice about which of the two variants s/he selects. This allows the calculation of the probability that where any instance of *abortion*/*miscarriage* occurs, one variant will be selected over the other. Any change point inferred by the model represents the moment at which this probability is estimated to change. In this study, such a change point would be expressed as a single calendar year between 1975 and 1995.

The change point model then approximates a probability distribution for any change detected; providing a percentage likelihood that the change has occurred in any given year of the study period. The model could report, for instance, that the probability of a change occurring in 1980 was 60%, or that the probability of a change occurring in 1990 was 98%. The aim of this study is to ascertain whether Beard et al.'s (1985) *Lancet* letter caused a sudden change in the frequency with which the lexical variants *abortion* and *miscarriage* were used in the three medical journals. Any degree of correspondence between the 1985 publication of Beard et al.'s *Lancet* letter and a detected change point will therefore be a significant finding. Such correspondence is unlikely to occur by chance, and therefore provides strong evidence of a causal link. This is also the case when change point analysis is used in other disciplines, but is perhaps especially true when change point analysis is used in linguistics. This is because language change tends to be organic and natural language change occurs gradually. As such, change point analysis tends not to be an appropriate means of studying most language change.

The diffusion of language change over time is commonly presented as an S-shaped curve, with a change beginning slowly, then taking off and increasing rapidly, before reaching something resembling a plateau (Wardhaugh and Fuller 2011, 222). Change point analysis, which is designed to pinpoint abrupt changes, is ill equipped to model this kind of change. Gradual change would be likely to result in a diffuse probability distribution, for example 1% probability of the change being located in each year over a hundred-year period. Change point analysis is much better suited to contexts in which change is sudden, meaning that the probability of the change being located in a given year will be reasonably high.

To provide a concrete hypothetical example, we could apply change point analysis to lexical changes which occurred during the COVID-19 pandemic. In our hypothetical study, we might find that change

point analysis reveals that a change in the frequency with which the acronym *PPE* appeared in the news media most probably occurred in 2020. The model might approximate the probability of a change in frequency occurring in 2020 to be 90%. The probability that this change occurred in 2021 might be 8% and 2019, 2%. In this example, the model would be approximating the probability that the change occurred between 2019 and 2021 to be 100%. The cumulative probability across the hundred years in the previous example, in which the probability of the change occurring in each individual year was 1%, was also 100%. This is, however, much less useful information about how and when the language changed. In what follows, corpus data from *The Lancet* (*The Lancet Issues Archive*), the *BMJ* (*BMJ* Articles Archive) and the *BJOG* (Wiley Online Library) will be analysed, in order to determine whether change point analysis can show that a rapid and abrupt change occurred in this instance.

5. Findings: A sudden change

Beard et al.'s *Lancet* letter urging the replacement of *abortion* with *miscarriage* was published in 1985. In this section, change point analysis will be applied to a purpose-built corpus of clinical usage in medical journals between 1975 and 1995. This will allow us to ascertain whether the intervention Beard et al. made in *The Lancet* prompted a sudden change in usage amongst their clinical colleagues, as Chalmers (1992) and Chamberlain (1997) concluded. Lack of a convincing change point will provide evidence for Moscrop's (2013) theory that the transition from *abortion* to *miscarriage* was a change in progress by the mid-1980s, and that Beard et al. (1985) did not play a pivotal role in prompting their colleagues to alter their usage.

As Beard et al. (1985) published their letter in *The Lancet*, this publication seems the obvious place to start the analysis. Whether Beard et al.'s (1985) letter resulted in editorial interference to substitute *abortion* with *miscarriage* remains an open question, and one on which it is hoped that the present paper can shed light. If the letter did have an influence on editorial policy at any of the three journals studied, it seems reasonable to consider *The Lancet* as the most likely candidate for such a policy. We can assume, after all, that many of those involved in editing the *Lancet* during the 1980s would probably have been exposed to the arguments which Beard and his colleagues put forward in their letter. It might, therefore, be considered surprising that data from *The Lancet* exhibits no clear switch from *abortion* to *miscarriage* around 1985. This effectively rules out the theory of editorial imposition of *miscarriage* as a preferred variant in this publication.

Figure 1, below, shows the frequency counts for *abortion* and *miscarriage* in article titles in *The Lancet*, during the study period.

[Figure 1 removed]

Figure 1. Frequency of *abortion* and *miscarriage* in *The Lancet* between 1975 and 1995.

By eye, it is virtually impossible to discern any decisive impact on usage in *The Lancet*, following the publication of Beard et al.'s letter in 1985. Usage of *miscarriage* does increase, but there continue to be several years after 1985 during which more articles were published in *The Lancet* with *abortion* in their title than with *miscarriage*. Raw data from *The Lancet* therefore seem to support Moscrop's (2013) conclusion that the shift from *abortion* to *miscarriage* was gradual; a natural language change, rather than one triggered or significantly expedited by any single factor or intervention.

It is perhaps ironic, given that Beard et al. published their 1985 letter in *The Lancet*, that its impact should transpire to be much more obvious in the *British Medical Journal* (*BMJ*) and *British Journal of Obstetrics and Gynaecology* than in *The Lancet* itself. In the *BJOG*, as Moscrop (2013) also found, there is a clear moment of switchover in the mid to late 1980s. Before this point, *abortion* is overwhelmingly the descriptor used when early pregnancy loss is mentioned in article titles. In fact, as Figure 2 shows, prior to 1987 *miscarriage* never occurs in the *BJOG* in this context.

[Figure 2 removed]

Figure 2. Frequency of *abortion* and *miscarriage* in the *BJOG* between 1975 and 1995.

This finding is perhaps unsurprising. Contributors to the *BJOG*, as either specialists in obstetrics and/or gynaecology, or clinicians with a particular interest in these specialisms, might be expected to be especially receptive to advice pertaining to these areas. Likewise, given the developments in society and in the field of medicine during preceding decades, it is possible that those specializing in obstetrics and gynaecology had already been using the vernacular variant *miscarriage* in their clinical practice. It is possible that the result of Beard et al.'s intervention in 1985 was not to expose their readership to the notion of patient preference for *miscarriage* and objection to *abortion*, but rather to legitimize it as a lexical variant appropriate for use in professional medical registers. According to this theory, *miscarriage* may have already been the prevailing variant used by clinicians in patient interactions, but only came to be regarded as an acceptable variant for use in the register of medical journal publications following the circulation of Beard et al.'s 1985 letter in *The Lancet*.

Like *Lancet* data, *BJOG* data also do not indicate that the shift from *abortion* to *miscarriage* was imposed as an editorial dictate. Had this been the case, we would expect an even more abrupt cessation in the use of *abortion* in the proscribed context of pregnancy loss. This is especially true of article titles,

which are of particular linguistic salience. Only a handful of occurrences of *abortion* occur in *BJOG* article titles between 1985 and 1995, but this is sufficient to indicate that no official editorial policy enforced the suppression of this variant. It would seem, therefore, that individual contributors to the *BJOG* changed their own usage.

A fairly abrupt transition from *abortion* to *miscarriage* is also reflected in *British Medical Journal* (*BMJ*) data from the study period of 1975-1995. In this instance, however, the shift is less clear-cut than in the *British Journal of Obstetrics and Gynaecology*. Whereas in the *BJOG*, *abortion* appeared only a handful of times in the period between 1985 and 1995, in the *BMJ* usage of *abortion* persists at a higher level into the 1990s, displaying a gradual decline.

As Figure 3 shows, however, *BMJ* article titles do exhibit a substantial increase in the frequency of *miscarriage* in the years following the publication of Beard et al.'s letter in 1985.

[Figure 3 removed]

Figure 3. Frequency of *abortion* and *miscarriage* in the *BMJ* between 1975 and 1995.

Miscarriage occurred very rarely in *BMJ* article titles between 1975 and 1985. Between 1985 and 1995, however, instances of *miscarriage* outnumber those of *abortion* on aggregate in article titles. As in *The Lancet* and the *BJOG*, this effectively rules out the imposition of an editorial policy on *abortion* as an inappropriate variant, since editorial proscription would be expected to have a more striking impact on the data.

Analysis of these data therefore lead us to conclude that some kind of trigger event in the mid-1980s seems to have had some, limited, impact on *abortion*/*miscarriage* usage in journal article titles. Occurrences of *miscarriage* clearly increase, whilst those of *abortion* clearly decrease. However, across the board this change is not a sudden switchover with only vestigial usage of the stigmatized variant persisting, as seems to be the case in the *BJOG*. Rather, in linguistic terms, there continues to be free variation between *abortion* and *miscarriage* into the 1990s.

On the basis of such equivocal data, it is understandable that there have been question marks over the role which Beard et al. (1985) played in prompting or catalysing the shift from *abortion* to *miscarriage* as the principal means of referring to early pregnancy loss in British medical journals. In cases such as these, where humans are unable to discern change points accurately, the insights afforded by change point analysis are invaluable. By allowing for the detection of abrupt changes in data series which humans may otherwise not be able to discern, change point analysis can reveal the impact of events which cause sudden language change.

In this instance, the purpose-built change point model reveals that there was an abrupt change in usage in the mid-1980s. It locates this change in 1986, with a very high probability level of 85%. This makes sense, given that Beard et al.'s letter was published in *The Lancet*'s November 1985 edition, giving other authors little opportunity to respond in 1985. As Figure 4 shows, the probability that this change occurred in 1985 is 14%, and the probability that it occurred in 1984 is 1%.

[Figure 4 removed]

Figure 4. Probability of change occurring in a given year between 1983 and 1987.

The aggregate probability that a sudden shift in usage of *abortion* and *miscarriage* occurred in the same year as Beard et al.'s letter or the following year, i.e., 1985 or 1986, is therefore 99%. It is, statistically, extremely unlikely that the change did not occur during these years. This is a finding of significance, indicating that Beard et al.'s 1985 *Lancet* letter did indeed have a decisive impact on the usage of clinicians publishing in British medical journals during the 1980s and 1990s.

Of course, the correlation which change point analysis provides falls short of proving the existence of a causal link. The possibility of another factor causing an abrupt shift from *abortion* to *miscarriage* can never fully be discounted. For this reason, thorough contextual research must be conducted in tandem with the application of change point analysis, if we are to exclude, as far as is practicable, the possibility that another unknown factor prompted the detected change. In this instance, as was established above, a gradual cultural shift towards *miscarriage* was underway during the early 1980s. The naming of the Miscarriage Association in 1982 and the title of Oakley's et al.'s (1984) *Miscarriage* attest to this shift. As was theorized above, it is possible that this gradual change in general usage influenced clinicians to use the vernacular *miscarriage* in their individual interactions with patients, priming them for the later transition in the more formal register of the medical journal. However, the fact that the change point analysis reveals a very sudden change in usage, rather than a gradual one, strongly indicates that a trigger event occurred at some point in the mid-1980s.

It is possible that the publication of Oakley et al.'s *Miscarriage* in 1984 was this trigger event. This book was, however, written for a general audience, and intended for those experiencing pregnancy loss, rather than those providing medical care. By contrast, *The Lancet* is targeted at a specialist audience such as fellow medical journal contributors, and is prestigious in reputation. Furthermore, Beard and his colleagues were pre-eminent in the medical profession, and therefore more likely to prove influential to other clinicians and medical researchers. Beard et al.'s (1985) *Lancet* letter moreover contains an explicit appeal to medical professionals to change their language, whereas Oakley et al. (1984) make no such appeal. We must, then, consider the balance of probabilities as to which of these texts is likely

to have been more influential in persuading those writing in *The Lancet*, *BMJ,* and *BJOG* to use *miscarriage* instead of *abortion*. It seems much more likely that the explicit intervention by the group of eminent clinicians in a prestigious journal, rather than an opinion expressed in a book written for a general readership, should have had such a striking effect on the usage of medical professionals.

6. Conclusion: A prescribed change

The clinical lexis used in relation to early pregnancy loss in British medical journals underwent a shift from the 1980s onwards, when physicians began using *miscarriage* instead of *abortion* in instances of spontaneous loss. This paper has re-evaluated the context of this change; using change point analysis to reveal an abrupt change in the data series of *miscarriage* and *abortion* frequency in three British medical journals. There seems little doubt that the transition from *abortion* to *miscarriage* in medical journals, and indeed its endorsement by Beard et al. (1985), was a product of its sociological milieu. This was a milieu influenced by the legalization of pregnancy termination in the 1960s, and an increased focus on safeguarding patient sensibilities. The specific question this paper set out to answer was whether this milieu was responsible for the change in usage of *abortion* and *miscarriage* in British medical journals between the 1980s and 1990s, or whether Beard et al.'s (1985) *Lancet* letter played a prescriptive role.

Change point analysis has provided an answer to this question. The data presented above clearly indicate that the change, in medical journals at least, was spearheaded by Beard et al. (1985). They allow us to conclude, moreover, that Beard et al.'s recommendation for the use of *miscarriage* does not seem to have been enforced as editorial policy in any of the three journals considered here. Had that been the case, a more abrupt shift would be expected.

Change point analysis cannot, of course, tell us how the change progressed outside of the three medical journals considered in this study. Further research would be needed to conclude whether the change disseminated in general usage before or after Beard et al.'s (1985) intervention. It seems more likely, however, given what Beard and his colleagues wrote in 1985 about patient preference, that their role was to legitimize the use of *miscarriage* as a lexical variant appropriate for use in the formal scientific register of medical journals. Further research would also be needed to determine whether clinicians were primed to make this transition by prior exposure to the vernacular variant *miscarriage*, or whether the shift was made solely in response to Beard et al.'s letter, following its 1985 publication.

Such questions, and indeed the central question of whether the transition from predominant use of *abortion* to *miscarriage* to refer to pregnancy loss was a natural or imposed language change, may seem to be of only niche interest. Natural language change, as was outlined above, occurs organically, in response to changing social attitudes and hierarchies, as well as contact between language users. This is the most common cause of lexical shifts. By comparison, unnatural language change, whereby the

desires, preferences, or agenda of a person or group who advocate a change, is thought to be relatively uncommon. As we have seen, this type of change is considered prescriptive, and the term *prescriptivism* is primarily used pejoratively by linguists; often in the context of self-appointed language experts or regulatory bodies attempting to impose language rules on other speakers. In English, such rules are usually disseminated via grammar books, style guides, and educational institutions, which attempt to regulate usage in accordance with some perceived standard. The agenda behind these rules is the imposition of this standard.

There is scant academic literature on how prescriptive agendas are imposed in contexts not involving language standardization. This has been called "politically responsive" prescriptivism (Curzan 2014, 38), and is intended to have a positive impact on others' experience of communication. In this era of increasing awareness of the importance of using language inclusively, in a non-discriminatory, inoffensive and considered manner, it is likely that such agendas will become more commonplace, both within medicine and in other spheres. Considering how Beard et al.'s prescriptive agenda was imposed successfully in the change-resistant genre of medical research (Biber and Finegan 1997), is therefore a significant first step in understanding how progressive language reforms can be brought about. Far from being a niche subject, of interest only to linguists in an academic ivory tower, this is a subject which affects us all.

The tentative conclusion that we can draw from examining the impact of Beard et al.'s (1985) *Lancet* letter is that patient voices may require the amplification of eminent medical professionals to encourage linguistic change in medical registers. Beard et al. (1985) report that the use of *abortion* to refer to pregnancy loss in clinical settings causes distress, but without their *Lancet* letter, this may have been much less widely recognised. This is a lesson of which those who have called for further reforms to the language of pregnancy loss over the last decade might do well to take heed. It would seem that the key to prescriptive success, as is also the case with other types of prescriptive agendas, is having a platform from which to be heard.

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Figure Legends

Figure 1. Frequency of abortion and miscarriage in *The Lancet* between 1975 and 1995.

Figure 2. Frequency of abortion and miscarriage in the *BJOG* between 1975 and 1995.

Figure 3. Frequency of abortion and miscarriage in the *BMJ* between 1975 and 1995.

Figure 4. Probability of change occurring in a given year between 1983 and 1987.