

Literature, history and biology

Peter Garrard on the uses of retrospective language analysis

'You're interested in language and Alzheimer's; why don't you analyse this?' said my wife, handing me her copy of *Jackson's Dilemma* – Iris Murdoch's controversial final novel. It had been a disappointing read: turgid, insubstantial, rambling; lacking the energy and momentum with which her earlier fiction moved.

It was 2003. John Bayley had published an intimate three-volume memoir of his life with Iris, and Judi Dench had portrayed, to devastating effect, the later stages of her neurodegenerative illness. We not only knew of the diagnosis but understood it as clinicians (my wife and I are both neurologists), so perhaps there was an element of retrospective interpretation. Yet professional critics had delivered their damning verdicts long before Alzheimer's was first announced: the novelist A.S. Byatt compared the book to 'an Indian rope trick, in which all the people are intent on going up the rope into an invisible world where they have no selves and therefore there is no story and no novel'; while for Hugo Barnacle it 'read like the work of a 13-year-old schoolgirl who doesn't get out enough'.

Prescient as this criticism may seem, however, the question still lingered: was the composition of *Jackson's Dilemma* somehow influenced by Alzheimer's disease? The diagnosis became apparent only after the book had been published, and surely even the most consistently great artists can disappoint. It has even been argued that *Jackson's Dilemma* is the deliberate result of an experiment in novelistic form (Todd, 2006), or a self-conscious caricature of her previous work.

This was the *Jackson's Dilemma* dilemma, which a systematic comparison of the book with two other Murdoch novels (1954's *Under the Net* and 1978's *The Sea, The Sea*) that I conducted

(Garrard et al., 2005) is now generally agreed to have resolved. The variables used (lexical diversity, lexical frequency, word length and syntactic complexity) had been extensively studied in large populations of 'live' Alzheimer's patients and behaved, in the context of these works of literature, in an analogous fashion. A conscious experiment in novelistic form that mimicked so precisely the linguistic features of a disease of which the author was an unwitting sufferer, would have been not so much prescient as preternatural. Moreover, the textual effects of Alzheimer's have since been reproduced in the works of Dutch novelist Gerard Reve (1923–2006) who also developed the disease during the final years of his life (Van Velzen & Garrard, 2008).

Murdoch's prodigious literary output included 26 novels, four plays and five volumes of philosophical writings, spread evenly over a working lifetime of more than four decades. A more extensive detailed textual survey may well prove even more interesting if it reveals the emergence at some point of a trend towards the patterns observed in *Jackson's Dilemma*. This laborious undertaking will entail the acquisition of a text corpus comprising over two million words, a task which, in the hands of my research group in Southampton, is nearing completion.

Retrospective textual analysis promises a uniquely illuminating approach to understanding the earliest stages of Alzheimer's disease. Looking back at samples of language produced spontaneously before the earliest symptoms of cognitive inefficiency became apparent could potentially open a window on the elusive presymptomatic phase of dementia. It seems likely that this period extends back over years, perhaps even decades. Given the brain's parallel structure and combinatorial complexity, many aspects of its performance are not visibly compromised by partial depletion of its functional units. It has long been recognised, for example, that significant loss of dopaminergic



SARAH LEE

John Bayley and Iris Murdoch

references

- Bernheimer, H., Birkmeyer, W. et al. (1973). Brain dopamine and the syndromes of Parkinson and Huntington. *Journal of the Neurological Sciences*, 20, 415–455.
- Garrard, P. (2009). Cognitive archaeology. *Journal of Neurolinguistics*, 22(3), 250–265.
- Garrard, P., Maloney, L. et al. (2005). The effects of very early Alzheimer's disease on the characteristics of writing by a renowned author. *Brain*, 128, 250–260.
- Kemper, S., Griener, L.H. et al. (2001). Language decline across the life span: Findings from the Nun Study. *Psychology and Aging*, 16, 227–239.
- MacAlpine, I. & Hunter, R. (1966). The 'insanity' of King George III. *British Medical Journal*, 1, 65–71.
- Ohm, T.G., Müller, H. et al. (1995). Close-meshed prevalence rates of different stages as a tool to uncover the rate of Alzheimer's disease-related neurofibrillary changes. *Neuroscience*, 64(1), 209–217.
- Peters, T.J. & Wilkinson, D. (in press). King George III and porphyria. *History of Psychiatry*.
- Pimlott, B. (1993). *Harold Wilson*. London: HarperCollins.
- Todd, R. (2006). What is Jackson's Dilemma? Proceedings of the third International Iris Murdoch Conference: University of Kingston.
- Tomlinson, B.E., Blessed, G. & Roth, M. (1970). Observations on the brains of demented old people. *Journal of the Neurological Sciences*, 11, 205–242.
- Van Velzen, M. & Garrard, P. (2008). From hindsight to insight. *Interdisciplinary Science Reviews*, 33(4), 278–286.

neurons from the nigrostriatal system in the midbrain may be present in patients with no clinical features of Parkinson's disease during life (Bernheimer et al., 1973).

A similar 'threshold effect' applies to cognition, which may remain apparently undimmed in the presence of profound cortical atrophy and established Alzheimer pathology (Tomlinson et al., 1970; Ohm et al., 1995), a phenomenon that has been referred to as 'cognitive reserve'. Yet cognition is an elusive concept: like 'the economy', it represents an aggregate of multiple interdependent indices, its performance may be influenced by being observed, and a small change in one component may have important consequences for the function of the whole system. A more manageable set of observations would result from studying a single component of the cognitive system. There are no candidates more suitable for this surrogate role than language: language integrity depends on a range of other cognitive domains and is implemented within a widely distributed set of brain regions. In a diffuse disease such as Alzheimer's, sufferers inevitably experience difficulty in both writing and speaking. Moreover, unlike indices of memory, attention or problem solving, linguistic activity can be, and often is, recorded and survives for many years with little or no degradation of information. Admittedly, most spoken or written language that has been recorded for posterity comes from historically or artistically important figures, but one of the best-known studies of retrospective language used stored samples of writing produced by members of a religious community fifty years earlier. One of the most remarkable findings of the Nun Study was the demonstration that language characteristics during early adulthood impact on the likelihood of developing late life dementia (Kemper et al., 2001).

We have recently begun looking for evidence of presymptomatic cognitive decline in archives of spoken language, using a figure from 20th-century politics whose words have been recorded faithfully (though not, alas, verbatim) in the pages of the Official Report – better known as Hansard. Readers familiar with post-war British political history will recall that Harold Wilson's decision to resign from office while Prime Minister in April 1976 has never been satisfactorily explained, and that his once prodigious intellect suffered progressive decline in

his later years. A plausible hypothesis – certainly more so than any of the spate of lurid conspiracy theories that emerged in the wake of his resignation – is that these two facts are linked. Unlike Iris Murdoch, no formal neurological diagnosis attaches to Lord Wilson, and his family has always kept the tragedy of his late-life cognitive decline private. Ben Pimlott's masterly biography of Wilson (Pimlott, 1993) deals sketchily with the twilight years, perhaps at the request of his wife and sons.

"linguistic activity can be, and often is, recorded and survives for many years"

Wilson himself, in response to concerns about his health several months before he resigned said that his physician had declared him 'as fit

as a flea'. To what

extent this cheerful assessment and the family's subsequent reticence reflect medical awareness and social acceptance of dementia can only be surmised, but the contrast with the attention paid to and allowed by Iris Murdoch and John Bayley some fifteen years later is striking.

Applying the reasoning that motivated the Iris Murdoch project, I wondered whether Wilson's language might provide any clues to his cognitive status in the months immediately preceding his resignation, and set about sampling the transcripts of his responses at Prime Minister's question time over three epochs during which he stood at the dispatch box fielding questions from the opposition benches. Crucially, these sessions were mostly unscripted, and include contributions from other parliamentarians. Speeches are transcribed for Hansard virtually as spoken, though distortions, stutters, and grammatical errors are typically 'smoothed out' in transcript. The speech samples can thus be regarded as a more than tolerably faithful record of the sentences uttered by each speaker, and yield a body of language against which Wilson's own could be compared. In a preliminary analysis (Garrard, 2009) I simply used the distribution of individual lexical items as a means of comparing the similarity between Wilson's speeches and those of all other contributors. There was a suggestion in the statistical analysis that the difference between the two samples was more marked during Wilson's first (1964–70) administration, than it was in the 12 months leading up to his resignation. A clearer picture should emerge when the samples are broken down into smaller time-segments (e.g. month by month).

A more remote, but no less

controversial figure from British history, about whom language analysis may yield important historical findings, is King George III (1738–1820). Thanks to a widely publicised series of articles by the psychiatrists Ida MacAlpine and Richard Hunter (1966), it has become widely accepted that King George's bizarre behaviour was due to acute exacerbations of the inherited metabolic illness, porphyria. An exhaustive reanalysis of the historical records, however, has revealed that this claim was based on spurious and selective interpretation of contemporary medical and historical sources (Peters & Wilkinson, in press), extrapolated liberally with respect to the ancestors and descendants of George III to create the appealing myth of a 'Royal Malady'.

The many pitfalls of applying contemporary clinical concepts retrospectively need not be rehearsed here, but the debunking of the porphyria theory nonetheless leaves an obvious diagnostic deficit. The King was an assiduous correspondent, both with his family and his ministers, and a large number of his letters have been preserved and published. We plan to look for changes in the linguistic structure of the texts of these letters and hope, with reference to the writings of a 'live' population of patients with uni- and bipolar affective disorders, that these will provide objective grounds for invoking a primary psychiatric cause for his famously strange behaviour.

Most diarists and letter writers do not find a place in political or literary history, but we believe that their linguistic legacy is potentially even more valuable. The late-life cognitive histories of countless elderly people in the United Kingdom are known in detail by their relations and friends. Among these, hundreds, perhaps thousands, will throughout their lives have written letters, diaries or professional documents. Together with the Oxford Project to Investigate Memory and Ageing (OPTIMA) we have been funded by the Medical Research Council to collect and look back at such samples in an attempt to characterise and date emerging changes. The lead-time between linguistic change and the onset of dementia will be a genuine retrospective measure of the strength of an individual's cognitive reserve. Variations could therefore yield important insights into the biology of common neurodegenerative diseases and perhaps suggest strategies that could lead to disease onset delay.

I Peter Garrard is Reader in Neurology at the University of Southampton
p.garrard@soton.ac.uk