

THE FINITE STRING NEWSLETTER

MARGARET MASTERMAN

[1910–1986]

Margaret Masterman was out of her time by some twenty years: many of her beliefs and proposals for language processing by computer have now become part of the common stock of ideas in the AI and MT fields. She was never able to lay adequate claim to them because they were unacceptable when she published them, and so when they were written up later by her students or independently “discovered” by others, there was no trace back to her, especially in our field where nothing over ten years old is ever reread. Part of the problem, though, lay in herself: she wrote too well, which is always suspicious in technological fields. Again, she was a pupil of Wittgenstein, and a proper, if eccentric, part of the whole Cambridge analytical movement in philosophy, which meant that it was always easier and more elegant to dissect someone else’s ideas than to set out one’s own in a clear way. She therefore found her own critical articles being reprinted (e.g., on Kuhn) but not the work she really cared about: her theories of language structure and processing.

The core of her beliefs about language processing was that it must reflect the coherence of language, its redundancy as a signal. This idea was a partial inheritance from the old “information theoretic” view of language: for her, it meant that processes must take into account the repetitive and redundant structures in languages and that a writer goes on saying the same thing again and again in different ways; only if the writer does that can the ambiguities be removed from the signal. This sometimes led her to overemphasise the existence of real and explicit redundancy: she would find examples of rhythmic repetitive verse and claim, implausibly, that normal English was just like that if only we could see it right.

This led to her emphasis in later years on the role of rhythm, stress, breathgroupings, and the boundaries they impose on text and the processes of understanding. To put it crudely, her claim was that languages are the way they are, at least in part, because they are produced by creatures that breathe at fairly regular intervals. It will be obvious why such claims could not even be entertained while Chomsky’s views were preeminent in language studies. She could never give surface criteria by which the breathgroups and stress patterns were to be identified by surface cues, or could be reduced to other criteria such as syntax or morphology, nor would she become involved in the actual physics of voice patterns.

Her views on the importance of semantics in language processing (which, it must be emphasised, she sought to convey in the high Chomskyan years of 1960–66) were much influenced by Richens’ views on classification and

description by means of a language of semantic primitives with its own syntax. These, and the associated claims about semantic pattern matching onto surface text, were developed in actual programs, and it might be assumed from that that she was a straight forward believer in the existence of semantic primitives in some Katzian or Schankian sense. Nothing could be further from the truth: she was far too much a Wittgensteinian sceptic about the ability of any limited sublanguage or logic to take on the role of the whole language. She always emphasised that semantic primitives would only make sense if there were empirical criteria for their discovery and a theory that allowed for the fact that they, too, would develop exactly the polysemy of any higher or natural language; and she always emphasised the functional role of primitives in, for example, resolving ambiguity and as an interlingua for MT.

She hoped that the way out might lie in either empirical classification procedures operating on actual texts (in the way some now speak of deriving primitives by massive connectionist learning), or by having an adequate formal theory of the structure of thesauri, which she believed to make explicit certain underlying structures of the semantic relations in a natural language: a theory such that “primitives” would emerge naturally as the organizing classification of thesauri. For some years, she and colleagues explored lattice theory as the underlying formal structure of thesauri.

Two other concerns that went through her intellectual life owe much to the period when Michael Halliday, as University Lecturer in Chinese, was a colleague at CLRU. She got from him the idea that syntactic theory was fundamentally semantic or pragmatic at bottom, in either its categories and their fundamental definition, or in terms of the role of syntax as an organizing principle for semantic information. She could be said to be the first AI person to be influenced by Halliday, long before Winograd and Mann. Again, she became preoccupied for a considerable period with the nature and function of the Chinese ideogram, because she felt it clarified in an empirical way problems that Wittgenstein had wrestled with in his so-called picture-theory-of-truth. This led her to overexaggerate the generality of ideogrammatic principles and to seem to hold that English was really rather like Chinese if only seen correctly, with its meaning atoms, highly ambiguous and virtually uninflected. It was a view that found little or no sympathy in the dominant linguistic or computational currents of the time.

Her main creation, one which endured over twenty years, was the Cambridge Language Research Unit, which grew out of an informal discussion group with a very heterogeneous membership interested in language

from philosophical and computational points of view. Subsequently, the attempt to build language processing programs that had a sound philosophical basis was a distinctive feature of the Unit's work. This approach to language processing, and the specific form it took in the proposed use of a thesaurus as the main vehicle for semantic operations, will probably come to be seen as the Unit's major contribution to the field as a whole, and it was Margaret who was primarily responsible for them. Her vision of language processing and its possibilities was remarkable for a time when computers were very rudimentary: indeed much of the CLRU's work had to be done on the predecessors of computers, namely punched card machines. Equally, Margaret's determination in establishing and maintaining the Unit, with the enormous effort in fund raising that this involved, was very striking: the fact that the Unit could continue for several decades, and in particular through periods when support for work in the area was hard to come by, is a tribute to Margaret's persistence. It is difficult for us now, in these days of artificial intelligence in the ordinary market place, and very powerful personal computers, to realise how hard it was to get the financial resources needed for language-processing research, and equally, the technical resources to do the actual experiments.

Perhaps the best comment on Margaret's initiative in embarking on language processing research, and specifically on machine translation work, comes from a somewhat unexpected source. Machine translation, after an initial period of high hopes, and some large claims, was cast into outer darkness by the funding agencies who saw little return for their money, and has only recently revived. Reviewing 25 years of artificial intelligence research in his presidential address to the American Association for Artificial Intelligence in 1985, Woody Bledsoe, one of the longstanding leaders of the field, though in areas quite outside language, said of those who attempted machine translation in the fifties and sixties: they may have failed, but they were right to try; we have learned so much from their attempts to do something so difficult.

What she and CLRU were trying to do was far ahead of its time. Efforts were made to tackle fundamental problems which overstrained the capacity of the computers of the day and the programming tools then available. Despite every kind of problem, the Unit produced numerous publications on language and related subjects including information retrieval and automatic classification. For over ten years the Unit's presence was strongly felt in the field, always with an emphasis on basic semantic problems of language understanding. Margaret had no time for those who felt that all that needed doing was syntactic parsing, or that complete parsing was necessary before you did anything else. Now that the semantics of language are regarded as a basic part of its understanding by machine, the ideas around CLRU seem curiously modern.

Margaret's main contribution to the life of CLRU was in the continual intellectual stimulus she gave to the Unit's research, and through this to the larger natural language processing community: she had wide ranging concerns, and lateral ideas, which led her, for example, to propose the thesaurus as a means of carrying out many distinct language processing tasks, like indexing and translation. Margaret's emphasis on algorithms, and on testing them, was particularly important for the development of the Unit's work on language processing; but her ideas were notable, especially for those who worked with her, not just for their technical qualities, but for their sheer joyousness.

Her colleagues and students will always remember her for her inspiration, not her written papers: she made questions of philosophy and language processing seem both closely related and, above all, desperately important. On their joint solutions hung the solutions of a range of old and serious questions about life and the universe. In this, as so much else, she was a Wittgensteinian but, unlike him, she was optimistic and believed that, with the aid of the digital computer it could be done.

She could not only inspire and create, but terrify and destroy: she had the dual aspects of Shiva, an analogy she would have appreciated. Even in her seventies, still funded by European Commission grants, her hair still black because a gypsy had told her forty years before that it would not go grey if she never washed it, she would rise slowly and massively at the end of a talk, bulky in her big, belted, fisherman's pullover, to attack a speaker, who would be quaking if he had any idea what might be coming. The attack always began softly and slowly, dovelike and gentle, gathering speed and roughness as it went. As many readers may remember, there was no knowing where it might lead.

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