

Deirdre Pratt

Methodos Series 8

Modelling Written Communication

A New Systems
Approach to Modelling
in the Social Sciences

 Springer

Modelling Written Communication

METHODOS SERIES

VOLUME 8

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Prof. Deirdre Pratt
Anerley Road 24
4001 Durban
Morningside
South Africa
deep@intekom.co.za

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Preface

Deirdre Pratt's book provides us with outstanding new tools for improving both research and teaching. How is one to determine the best way to analyse composition, given the various approaches which have flourished since a half century? And how to take advantage of the wealth of observations and of ideas piled up about language, discourse, composition, academic writing, and social context? How to go beyond the multiform and idiosyncratic character of writing and to manage to identify what is constant in it? And how to find the way in which knowledge and writing are intertwined? How to define the social nature of composition? And how to take a stand on the competing epistemological tendencies, from positivism to post-modernism? These are long-standing and vexed questions to which the author brings luminous and elaborated solutions. She does so by implementing a new systems approach, and by initiating a new way of modelling academic writing. Moreover, these theoretical and methodological breakthroughs open the way to conceiving and finalizing a new electronic writing tutor program. The "New Electronic Writing Tutor" (*NEWT*) is now operational, having been tested out in several training centres, and can accommodate different teaching approaches, disciplines and learner levels, as it can be adjusted to suit the specific context in which it is used.

The author recounts the main points of an investigative journey which lasted for 20 years or more. The wording is elegant and simple. We are invited to share an intellectual adventure, meeting the obstacles and surmounting them together with her. At each new stage the problems at stake are re-examined from every angle, and we are informed about the diverse proposals which have been advanced in the literature in order to resolve them; these advances are discussed with care. We are thus kept up to date with the results reached until now about academic writing, and we may profit from the extensive bibliographic resources to which the author refers. We are also well-equipped to judge the relevance of the outcomes she discovered. What is more, her impressive self-critique helps us to form our own opinion, since each step forwards is immediately submitted to a ruthless examination in order to measure its limits.

"I am in a sense the 'pit bull' of investigation", she says, in describing her tenacity in seizing on a concept and worrying away at it until having a more satisfactory answer (*Introduction*). Francis Bacon, for his part, claimed that true scientific

investigation needs the nose of a hunting dog. In order to explain writing – just as in order to explain heat or light – we need to accumulate clues like the hunting dog casting about everywhere for the scent of the prey. It was in comparing the countless observations which she collected that the author arrived at the *principles* or *axioms* of composition, and particularly, at a basic interactive principle. This way of doing research is *classical* induction,¹ which Bacon proposed as a new *organon* in doing science, and which has nurtured the blossoming of modern sciences from Kepler until now. Bacon's induction has nothing in common with generalization from particular facts, and yet is persistently confused with it. Of course a collection of observations would remain sterile without being subjected to intensive reasoning in order to refine and progressively restructure their interpretation, as Bacon vigorously claimed 400 years ago. Observation and reasoning, in classical induction, must be closely associated.

Practising induction leads easily to *realism*. When one wonders about the possibility of really knowing the world as it is, as philosophers tend to do, many objections to realism come quickly to mind. For instance our senses are deceiving; moreover, the knowledge we have of the world is, obviously, nurtured by culture and channelled by social life. Yet when practising induction we discover that sustaining our reasoning by extended observations gives us signal advantages when trying to explain some phenomenon. The author found support in *critical* realism, an illuminating approach issuing from Bhaskar's works. This kind of realism distances us from the empirical tradition established by Locke and Hume and which resulted in neo-positivism. Critical realism pursues another famous movement in the history of philosophy, that of classical realism supported by Bacon, Galileo, Newton, Huyghens and their allies. The author of this book is undoubtedly in good company. And to those ones who think that the philosophy of science is best inspired when looking to how researchers are doing their work, this will offer valuable guidance: it shows how critical realism takes shape in actual instances of research, and how classical induction can be carried out in the human sciences.

A most interesting and unusual feature of this book is its detailed account, at each new stage of the inquiry, of the research method which has been implemented. It allows the reader to judge the relevance of the scientific processing and its fruitfulness. Needless to say, this is a main supplementary motive for the *Methodos* series, devoted to improve research methods in the social sciences, to publish this book; in Daniel Courgeau's and in my own opinion it might serve as a pattern of scientific

¹Usually, philosophers confound *classical* induction which what is currently meant by the term induction, i.e. the generalization of some particular observation. Usually, they don't pay attention to the recommendation of *classical* induction to accumulate numerous and diverse observations, and to compare them; and usually, they don't pay attention to the difference between, on one side, a general statement about some observation, and on the other side a *principle* (or *axiom*) by which the numerous collected observations can be explained, which is the genuine target of *classical* induction.

research for the social sciences whatever the object of study, be it in economy, in demography, in sociology or elsewhere.

The core of the method followed by the author consists of taking advantage of two different ways of modelling, empirical and theoretical. Empirical modelling is well illustrated by causal modelling in econometrics, but it is also currently used anywhere, when we want to represent a network of observed variables which combine in some phenomenon. Theoretical modelling is much more difficult to arrive at: it tries to identify the abstract structure which underpins and determines an empirical network of variables; classical dynamic laws – for example the law of gravity – illustrate eminently the theoretical model. These two different sorts of models are confused in the social sciences more often than not, with the result that empirical models are often taken for theories.

In the first volume published in 2002 by the *Methodos* series, the difference between empirical and theoretical modelling has clearly been established and defined, and the relations between empirical and theoretical structures – structures which the two sorts of modelling respectively make apparent – have been scrutinized. The result is that, once differentiated, the two ways of modelling can improve each other, and after being duly combined they reinforce the quality of explanation of the concerned phenomenon. This methodological advance was reached after a thorough inquiry made by a multidisciplinary team of thirteen researchers into nine disciplines.² Pratt had recourse to this methodological advance and it helped her to probe into the very nature of writing and to conceive the interactive principle on which her composition software was based. Her work backs up the efficiency of the methodology provided by Volume One of the *Methodos* series.

Robert Franck

²These disciplines were archaeology, demography, economy, engineering, geography, comparative politics, experimental psychology, sociology and philosophy of science. Modelling practices examined were statistical modelling, mathematical modelling, conceptual modelling, diagrams, maps, machines, artificial neural networks and computer modelling (Franck 2002).

Introduction

Written composition is a mode of communication which is essential for learners in formal education to master for academic progress, as it is the vehicle for much of what is learned as well as the chief means of assessment. It is closely associated with intellectual development; in fact, it is the “currency of intellect” as it now stands in human society (but may, of course, not always be so). Yet it is a field divided by schisms and fraught with academic infighting, with composition instruction dominated at first (i.e. when I was a novice teacher) by form-based approaches, with scarcely a brief interlude in the liberal humanism of process approaches, before diversifying into critical, constructivist and yet other discourse-based approaches, which still dominate the field at the time of writing. No account of writing is innocent, and even scholarly debates tend to become acrimonious (see the 1993 interchange between Canagarajah and Raimes, which is not as acrimonious as some, however). This is because views of writing – and how it should be learned – inevitably reflect views as to what constitutes reality as well as knowledge, and cut to – or rather, cut into – one’s most cherished beliefs and values. I need, then, to be upfront about my own position, and include in this opening narrative both where I am coming from and what I intend by this volume.

Firstly, I am a realist, and, as such, strive to fathom the causes of things. Next, my interest in writing is not merely academic, in the sense of being an area for investigation. As a teacher (for 22 years), lecturer (for 18 years) and supervisor (for the last 8 years) I needed – and still need – to know how students learn to write and write to learn. As a child I loved reading and writing stories; as a school teacher and, later, lecturer I struggled to teach composition to packed English classes; as a doctoral candidate I grappled with new genres as well as the protean research topic of written composition. Supervisors who found my work not only incomprehensible but abhorrent (i.e. wrong paradigm) pointed out that perhaps they did not understand it because I did not write too well (the ultimate indignity for a researcher of writing!) I began to think that my view of not only writing, but also reality, must be somewhat weird, but I later learned that a whole group of people (i.e. critical realists) saw reality from very much the same perspective, which was a huge relief. It was even more of a relief when I read Robert Franck’s (2002) book on modelling, and found that I had faithfully been following, or authenticating, rather, his “model of

modelling” for many years without knowing it. I did, however, shed some tears on trying to understand certain formal concepts, as my knowledge of the Philosophy of Science was – and still is – limited.

This account, then, will look at the nature of reality as well as the nature of writing, and the way in which knowledge and writing are intertwined. I must confess that am in a sense the “pit-bull” of investigation. When I catch the scent of how something works, I will seize on the concept and worry away at it until I have a more satisfactory answer, that is an answer based on authoritative sources (including observation) and logic as well as intuition. It may not be the “right” answer, but it will be the best answer I can arrive at under the current circumstances, the “truth” as far as I can establish (see Bhaskar 1978:249). I undertake, then to give a faithful account of what I believe to be true, with the proviso that truth in critical realist terms is tentative, transitory, and shaped by both context and local needs. The aims of this work, which will be expanded briefly below, are as follows:

- to provide a description of writing which fits with the social phenomenon as experienced and observed in a lifetime of writing, teaching and research;
- to give an account of the modelling process whereby the description of writing was arrived at;
- to give an account of the models formulated, showing how they established writing as a social process;
- to describe the practical application of the modelling in the creation of a computerised writing program;
- to suggest further applications and developments based on the models, including how they offer insights into the connection between writing and learning.

A Description of Writing

In keeping with the author’s critical realist stance, the modelling was intended to arrive at a description of the “essence” (Bhaskar 1979:16) of written communication. It resulted in a description of writing as a social process, in fact, as a social mechanism (Pratt 2005a). The refined applied model of composing is thought to constitute a type of “social algorithm” (Blunt Bugental 2000) whereby young people learn social practices, usually implicitly, by following the example of elders, but such patterns can be made overt in formal education. The resultant description went some way towards explaining both the variation in and nature of current approaches to composition instruction, including the process approach (both expressive and cognitive schools), genre-based approaches, social constructivism (and constructionism), critical approaches, and the New Literacies approach. I must emphasise here that supporters of such approaches would not necessarily agree with my explanation, nor particularly welcome it: they would probably, however, agree on the surface manifestations of composing for which I attempt to give a deep structure explanation.

The Modelling Process

A type of classical induction, or reverse engineering, was used in the modelling of written communication, following Franck's (2002) description of the modelling process. At first this process was followed intuitively, but later, with conscious intent, working backwards to unravel all of the stages. Franck summarises the modelling process as follows:

- (1) Beginning with the systematic observation of certain properties of a given social system, (2) we infer the formal (conceptual) structure which is implied by those properties. (3) This formal structure, in turn, guides our study of the social mechanism which generates the observed properties. (4) The mechanism, once identified, either confirms the advanced formal structure, or indicates that we need to revise it (2002:295).

The mechanism has two aspects, formal and applied. The formal aspect would be, for example, the system of functions necessary to calculate and display the time: the applied, the various forms clocks and watches might take to carry out the functions required to calculate and display the time (e.g. sundial, candle clock, pendulum clock, gear watch, digital watch, and so on). Franck emphasises that modelling does not occur in a neat, linear progression, but that some steps of the modelling process may be pre-empted or occur simultaneously, and that there may be recursion, even several cycles, as in my own experience. Early on in my investigation I had formulated an applied model of composing (*Stages of the writing process*) which I had tested out against over 40 reconstructions of student composing using an original video protocol method. After some time spent worrying away at the problem of *why* these specific stages featured in my first applied model, I realised that they carried out certain aspects of communication. Franck's description of modelling revealed that these aspects in fact comprised a system of functions which were prerequisites for communication. In effect, I had discovered what Franck terms a theoretical model of composing, a system of communicative functions, which underpinned – and explained – the applied (or empirical) model of composing, *Stages of the writing process*.

The Models Formulated

Three models were formulated in all, the earlier applied model, or pedagogical model of composing, *Stages of the writing process*, the later applied model, which had been refined to clarify the social operation of writing, and included an input option, and the theoretical model, or system of communicative functions. A combination of the latter two could be seen to constitute a description of the mechanism whereby written communication is effected (i.e. the formal and applied aspects described by Franck). The most difficult part of the modelling was to refine the applied model so that the social aspect of composing, as well as social influences on composing, could be made clear. This required a further round of video protocols (13 in all, as I had not the heart to turn away the three student volunteers over and

above the 10 deemed necessary). Analysing the protocols helped to validate modifications to the first applied model, in particular the provision of an input option. The second applied model shows that composing requires a social *function* to be performed (i.e. so that the written interaction conforms to social mores) as well as being affected by factors in the social *context* in which it takes place. These latter social factors might set in place the social conventions to be followed as part of the social function, but they might also affect the performance of other functions, for example, what one is allowed (i.e. in a given context) to include as content in writing.

The achievement of the modelling process was that it made it possible to identify what is constant and what varies in composing, of which a satisfactory account had not hitherto been achieved; this is why writing was thought to be too complex to describe satisfactorily even by process-oriented researchers (Lynn 1987, Raimes 1985, Spack 1984). The modelling process also provided a “deep structure” explanation of composing, the model of communicative functions. This not only constituted a systemic model of communication, but also a principle which could later be used to explain other interactive social phenomena, as will be outlined below. In a sense the generalizable principle was one of the key discoveries of the modelling process, in terms of its potential for being applied in other areas or fields. Franck emphasises that discovering such principles by means of systemic modelling addresses one of the main weaknesses of the social sciences, namely the omission to combine the results of investigation to provide a coherent and encompassing description of social processes with anything approaching the force of the “laws” of the natural sciences. According to Franck, “The explanatory power of a theoretical model constructed in this way can equal the explanatory power of natural laws” (2002:298).

The Writing Tutor Program

As Bhaskar emphasises, it is praxis – or practical application – of new insights which leads to empowerment, and not knowledge per se (1986:170–172). The practical application of the modelling process was composition software. This took the form of a writing tutor program, as a means of modelling the systemic operation of composing for the learner writer. The making of *NEWT* (acronym for the New Electronic Writing Tutor) in fact provided the main stimulus for completing the modelling process, as designing the computer program required identification of the commonalities and variables in composing, that is the intra- and extra-systemic operation of written communication. Designing the program so that the learner had an input option to capture local variables meant that the writing tutor program could be customised not only to fit various levels of instruction, but also to suit individual learner needs and preferences. *NEWT* has been piloted with learners at school and undergraduate level, as well as with higher degree students, and several modifications and enhancements have been programmed into the prototype. It is currently

part of an institutional and community project, to be run via an interactive website with online materials and discussion forums. To sum up the benefits of the writing tutor program: (1) it leads students through the composing algorithm at their own pace and in any preferred order, thus relieving the teacher of the drudgery of having to explain the systemic features of composing over and over again; (2) it allows the user to customise composition instruction to fit specific learning needs; and (3), according to students who have used it, it is fun, and thus provides intrinsic motivation for learning.

Further Applications and Developments

Reconstruction of student composing using video protocol analysis suggested that learning and writing were intertwined in composing, in the sense that knowledge was being constructed as students planned, wrote and revised. It was in fact difficult to distinguish between the two processes (i.e. semiosis and poiesis). It later became apparent that learning requires the same system of functions to be effected as composing, which meant that the theoretical model of composing could in fact be used as a course design principle. Apart from providing a “parallel system” working in tandem with – and thus reinforcing – the learning process, writing also provides the learner with a recorded template of emerging concepts (i.e. the written text) and thus makes for more intrapersonal interactivity as well as extended opportunities for reflection. Factors such as these may explain why writing is seen as being closely linked with intellectual development rather than as merely providing a record of cognitive activity. These and other synergies will be explored later.

The model of communicative functions provided a generalizable interactive principle for use in other areas or fields of social science, and so far it has been used with some success in the following applications:

- Course design (in both classroom-based and online courses)
- Formulating a model of blended learning
- Research capacity building
- Film analysis
- Developing a theory of hypermedia communication

While the system of communicative functions has obvious application for any kind of communication (e.g. graphic, nonverbal, or learning interaction, including research), the most interesting new development is the notion that it might provide the basis for a model of interactive determination. This would require a conceptualisation of the functions which would fit interactions other than communicative, and might best be represented mathematically.

It must be remembered that the investigation documented took place (formally and informally) over a period of 20 years, and that it went up many blind allies before struggling back on to the main path. I personally went through four paradigm shifts, where I genuinely though myself to be operating in turn, from within a

hermeneutic, critical, constructivist or critical realist orientation. At a crucial stage of my doctorate I was afflicted with a life-threatening disease (advanced hyperthyroidism), which made me seriously consider if anything was worth dying for, in particular, the generation of new knowledge. My dogged pursuit (to continue the pit-bull metaphor) of what I believed to be the truth about writing caused rejection by peers, delayed certification, missed opportunities for promotion, and a fair amount of physical and financial hardship. The rewards have more than compensated for any hardships suffered, in particular the acquisition of more than 20 students for doctoral supervision (and having to turn away others), mostly colleagues, teachers and teacher trainers, but also younger folk, some of the “brightest and best” in KwaZulu-Natal, of mixed demographics and mother-tongues, but all interacting at an advanced intellectual level and playing out the variations of the interactive principle in both investigation and writing. There is, then, a “happy ending” to my endeavours to seek the truth. In attempting to convey the essence of the modelling process and outcomes (i.e. without reconstituting the 20-year journey and associated travails) this volume will be structured as follows:

Chapter 1: Review of Composition Software

As *NEWT*, the writing tutor program, was both the stimulus for and practical application of the modelling process, this chapter will give a review of composition software available at the time of the modelling and show the need for such a program. The following types of applications for computerised composition instruction were available at the time the *NEWT* prototype was designed:

- (1) conferencing-type tutors
- (2) tutors based on text-analysis
- (3) tutors based on heuristics or invention strategies
- (4) text or revision tools
- (5) organisers
- (6) process-based tutors

This categorisation has not changed materially since then, except for slicker packaging – and a harder sell – of the various options. All of the above applications deal with some aspects of composing, but none distinguishes successfully between the commonalities and variables, or allows the writers the infinite flexibility observed in composing procedures which has prompted researchers to suggest that writing behaviour is too idiosyncratic to be categorised. This section is included, then, to show how effective composition software needs to be informed by a model of writing which shows composing as a social mechanism with intra- and extra-systemic variation. From the critical realist perspective adopted here, the aim of the modelling process is to empower learners by offering a practical application of theory: the writing tutor program is one such application.

Chapter 2: Critical Realism

As I have suggested earlier, this work is written from a critical realist perspective which fits my own naïve sense of reality. As Cupchik points out, it is not that difficult to establish what is real in everyday life:

Not surprisingly, it appears easier to address the nature of “reality” in everyday life than in philosophy. If you were to ask people on the street for examples of *what is real*, they could readily respond. Giving birth is real. Catching AIDS is real. Being left by someone you love is real. Getting tenure (or not) is real. So the standing of *what is real* does not appear to necessarily challenge people. It is *real* enough when a context is clear. In daily life, we frequently ask ourselves: “Is it *real* or simply a figment of my imagination?” We can wonder whether or not a comment was said in jest or if an offer of assistance was sincere. Does so and so “really love me” or is it simply “wishful thinking”? Similarly, people are aware of intense *states of subjectivity*. “I liked the movie very much even though you hated it!” “I like that painting and I want it, and I’m paying for it!” “But, this is our house, so where are you planning to hang it? I hate it!” (Cupchik 2001, para 8).

How one constructs knowledge, particular in the formal research sense, or the philosophy of science, is another matter. What is particularly problematic is finding an orientation for formal investigation within which one can be congruent. Written composition – in fact qualitative research – is dominated by approaches which view writing as being constructed in or by discourse, which is often equated with text. From the latter perspective, anything presented from a realist orientation appears not only incomprehensible but dangerously deviant, deranged even. This view is not limited to South Africa. On explaining my research paradigm to a fellow-delegate at an overseas conference in Calgary, Canada, I was told that I could not have insulted her more if I had tried: this, just by explaining critical realism! The only major critical realist work on composition at the time of writing is by Donald Judd (2003). Judd’s perspective is very different from mine, in that he focuses on possible mismatches between theory and practice in three main composition schools. In spite of this very different focus, I found Judd’s work invaluable for his excellent exposition on critical realism, which, it must be noted, takes up almost half of his volume: this should indicate just how new to composition studies critical realism is.

The approach taken in this volume is also very different from that presented in mainstream work on written composition, and understanding the realist perspective is crucial to understanding why the modelling took place (i.e. to understand the nature of writing) and why it took this particular form (i.e. as describing an observable process, an “event” in Bhaskar’s ontology). This is why it is very important that this chapter explains what the critical realist philosophy is, as well as what it is not, for what is axiomatic in one paradigm is often a fallacy in another. As the problem of agency is considered problematic in critical realism, and composing is a social process carried out by human agency, I hope that I have made some modest contribution to the field in suggesting a distinction between what I have termed “intentional” and “contingent” determination, and in pioneering the use of the “conceptual mechanism” as educational tool. This will, however, be discussed in the next chapter, [Chapter 3](#), which explores the key critical realist concept “mechanism” in more detail.

Chapter 3: The Modelling Process

As this volume is on the application of a modelling process which is suggested as an exemplar of systems modelling in the social sciences, this chapter is a crucial one in understanding the process. Although the critical realist orientation fitted my everyday thinking, it did not suggest a suitable research procedure to fit my purpose. Bhaskar has been criticised for being somewhat vague about the precise details of a critical realist investigative methodology: he saw it as the work of the specialist in the field to find a *modus operandi* suited to that particular discipline. I found that Robert Franck's work on modelling (2002) dovetailed marvellously with Bhaskar's philosophy, and offered a much more precise definition of the key realist term "mechanism" (I blush to think of some of my earlier interpretations, before I was able to differentiate clearly between mechanisms, causal agents and causal factors). While helpful respondents on the *Bhaskar Mailing List* had assured me that modelling was a preoccupation typical of critical realism, Franck's work gave a precise description of the modelling process; even more remarkable was that it described the process I had actually followed for over 18 years in investigating composing processes. I could then retrospectively "wrap up" the modelling process in formal investigative terms. I found it necessary to break Franck's description down into a series of stages. It is thought that these might help the reader both to follow the course of the modelling described here, and to apply Franck's method in other areas of social science. To summarise briefly, Franck's method is an elegant example of classical induction, balancing a formal model of functions against the practical description of a process, verifying the former against the latter, and the latter against real world functioning.

Chapter 4: The User's Model of Composing

At the very outset of my investigation into writing I had developed a schema of composing in order to model composing processes for learner writers (*Stages of the writing process*, Pratt 1987). While I had been involved in formal study at the time (masters in Applied Linguistics) the process had been largely intuitive in response to a pressing educational need, but had also been informed by 5 weeks' intensive reading, mainly on the process approach to writing. At the time I had not known what kind of creature I had discovered lurking in the thickets of my mind, hence the term "schema"; I just knew that I had promised my undergraduate tutorial class a description of composing which would help them to write their term paper, and I could not find a satisfactory one in the literature. At a formal level, I could relate it to what Widdowson termed a "user's model", that is a description of language use from the point of view of the naïve user rather than one based on linguistic theory (Widdowson 1984:9). Unravelling the modelling process from Franck's perspective, almost at the other end of the investigation, revealed the user's model to be an applied (or empirical) model of composing. It was, however, an applied model

containing, implicitly, a system of communicative functions, which, in Franck's terms, constitutes a theoretical model of composing. I did not formulate this system of functions clearly until much later, as the communicative functions are adapted almost beyond recognition in the applied model. The user's model is a key aspect of the modelling process documented here, the fulcrum, as it were, on which the rest of the process balances. The communicative functions could not have been identified clearly had it not been for the way in which they were separated in writing, much in the way that litmus paper reveals separate bands of elements in chemical compounds. The irony was that, while their separation in writing made it possible to identify the key functions which need to be performed for communication to take place, their highly idiosyncratic expression in writing masked their true nature.

Chapter 5: Testing Out the User's Model

One of the stages of Franck's modelling process is testing out the applied model against real-life situations or against data. This validates – or signals further modifications to – the applied model, which can then, in turn, be used to validate the theoretical model. This chapter shows how the testing process, carried out in over 40 video protocols of student composing, validated the user's model as far as the systemic operation of composing was concerned, but showed up flaws in categorising the social aspects of composing, more specifically, how to portray the impact of local academic criteria on – and in – the composing system. The model in fact displayed the same weaknesses as the approach on which it was initially based, the process approach. This chapter, then, offers a brief description and critique of the process approach, and shows why other more socially conscious approaches were not seriously considered as options for modifying the user's model. The chapter also describes the video protocol method used to reconstruct composing, as well as the depiction of the systemic operation of composing in colour-coded graphs. The video protocol method using split-screen recordings revealed complex cognitive processes, which are an integral part of composing processes, but would not have been accessible in such detail otherwise. The composing profile graphs compiled from the protocol data (i.e. on videotapes, audiotapes and texts) show the systemic operation of the composing mechanism at a glance, and make it easy to compare phases of the same composing session against each other, as well as comparing different writing profiles, something which narrative accounts alone make difficult.

Chapter 6: The Theoretical Model of Composing

If the user's model is the fulcrum, the theoretical model of composing is the apogee of the trajectory of events in the main cycle of modelling, in the sense of being the high point of the discovery. This is because, once the theoretical model of composing had been expressed in formal terms, as being the system of functions “without

which” communication could not take place, it led to insights about not only written communication, but other communication modes. In fact it suggested that communication systems operated in the complex kind of layering which is a feature of the critical realist ontology, with (at least) primary and secondary systems being involved. The theoretical model of writing generated insights into the nature of writing beyond what had been sought for, as well as suggesting some related hypotheses on the formation of modes and genres. Most importantly, the formulation of the theoretical model led to further refinement of the applied model so as to make sense of all composing, and not just “good” writing (as in *Stages of the writing process*). The applied model could then be tested out against further instances of actual composing to see whether the refinements accurately represented actual instances of intra- and extra-systemic variation in composing, and whether the model now clarified the social aspects of composing.

Chapter 7: The Explanatory Force of the Models

Models in social science are validated, to some extent, by their explanatory force. This chapter looks at the insights the refined applied model offered in making sense of actual instances of composing in 13 more video protocols, as well as retrospectively, in terms of what the first applied model had already validated: in 35 instances the evidence of clear stages in composing had already been confirmed. The applied model could then be tested out against further instances of actual composing to see whether the refinements accurately represented actual instances of intra- and extra-systemic variation in composing, and whether the model now clarified the social aspects of composing. An analysis of the data obtained in the 13 video protocols suggested that the refined applied model of composing explained actual instances of intra- and extra-systemic variation in composing, and, more importantly, showed that much of the intra-systemic variation was triggered off by contingent factors. Finally, the refined model clarified how social factors worked both outside and inside of the composing system, which is in fact the most significant contribution of the whole modelling exercise, as composing can now be represented as a social process. The testing out of both applied models validated the theoretical model, which, being a generalizable principle, could then be used as the basis for applied models in other areas.

Chapter 8: The Writing Tutor Program

This chapter gives an account of the practical application of the modelling, *NEWT*, the writing tutor program. Both applied models provided “blueprints” for the writing tutor program, the first, in terms of its pedagogical value, with helpful specific advice and guidance, the second, in terms of its algorithmic expression and the input option, which allowed local social criteria to be captured. Computer programming

is not a forgiving mode, and represents social processes only to the extent to which they have been represented accurately – and comprehensively – in the original design. Once a social process has been expressed in algorithmic terms, however, the concomitant algorithms involved in programming can be brought into play to represent the process faithfully to the intended user. The second applied model represented composing as a social algorithm, and the software could then replicate this algorithm in machine language. While this particular form of practical application may seem to occupy a small area of the options available in the general scheme of things, it is in fact the most powerful application as a force for social transformation, as a computer program can easily be disseminated worldwide.

Conclusion

A general Conclusion will be provided to sum up the themes explored in this volume, to document subsequent findings and applications, and to suggest further avenues of exploration associated with this type of social science modelling.

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Chapter 1

Review of Composition Software

1.1 Introduction

This chapter explores the concept of using computer programs to assist with composition instruction, first examining some principles for using computers in writing instruction, and next, reviewing a selection of currently available composition software. While the latter covers diverse aspects of writing, and process-based programs come the closest to replicating some of the functions of human tutors, none in fact covers both procedural and social aspects of composing. The chapter concludes with identifying the need to base the proposed writing tutor program on two models: an applied model which deals with both procedural and social aspects of composing, and a theoretical model showing the “deep structure” of communication in written mode. Two models are thought to be necessary, so that the applied model is based on more than “rule-of-thumb” or ad hoc application, and is not only validated against composing in real-life situations but can be seen to reflect something of the nature or “essence” of writing.

1.2 General Principles for Using Computers in Writing Instruction

Hughes suggests the following general principles for using computers in writing instruction:

1. Teachers should beware of both the positive and the negative hyperbole about computers in education.
2. Teachers should decide on educational goals and methods first, then consider how computers can be useful (not the other way around).
3. Teachers should consider computers primarily as tools for writers, not as omniscient teachers.
4. Teachers should consider using computers as part of their instruction, not as the instruction.
5. Teachers should know that just because programs can do something does not mean it should be done.
6. Teachers should know that there is no Platonic ideal of a program for writing instruction.
7. Teachers should be realistic about the time and the costs associated with using computers in writing instruction (1989:1–2).