THE HAND AND THE TRACE: SOME ISSUES IN HANDWRITING

The quarterly journal concerned with all that is involved with our being literate

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Rosemary Sassoon

HANDWRITING— HOW MUCH DO WE KNOW ABOUT IT?

EDITORIAL

Interest in handwriting research has increased in the past few years and maybe this is a good moment to stand back and review the situation—to see how much or how little we actually know about the realities of the written trace, or even about our own writing system. Are we asking the right questions to provide valid answers to many of the pressing problems that need to be solved today, particularly in education?

One persistent difficulty that needs addressing is the frequent inability of one discipline, within the many involved in handwriting studies, to comprehend another's terms. We must ask whether there is a precise enough terminology for letters, not only to communicate with each other but to inform and detail individual investigations.

It is the underlying need to consider the many facets of handwriting that actually limits the relevance of so much handwriting research. Unless the researchers who design a project have some understanding of the complex nature of handwriting before they start, then their

conclusions, if not their detailed findings, may be limited or worse still, distorted by too narrow a view. It is towards this kind of broader understanding that this particular set of papers was commissioned.

In some areas, in particular motor studies and the computer recognition of letters, a great deal has been published recently, much of this as a result of the formation of the International Graphonomics Society, a group that meets every two or three years and publishes selections of their papers (e.g., Thomassen et al, eds. [1983]; Kao et al, eds. [1986]; Plamondon et al, eds. [1989]; and Wann et al, eds. [1991]). In view of the availability of these specialized publications, those particular fields of study are not represented here.

WHAT WE DO NOT KNOW ABOUT HANDWRITING

This issue first looks not so much at statistical evidence but at some of the imponderables of handwriting. It reviews the literature concerning the origin of our alphabet and suggests a possible solution to a riddle about which solid evidence may never be uncovered. Then, ignoring conventional symbols, the relationship of the wielder of the implement to the individual trace is explored. This surely must be considered in all findings even if it cannot be fully understood, much less quantified.

A terminology is presented for letterforms, also one for the hand, which is necessary to the understanding of how we write. The team from the University of Reading would like to think that their paper concerning letterform terminology is a discussion document that should produce reactions from the wider readership of *Visible Language*. The terminology of the hand has been provided by an orthopedic surgeon with a particular interest in the ergonomics of handwriting.

THE MEDICAL ASPECTS OF HANDWRITING

Handwriting is a valuable diagnostic tool, a direct, permanent and measurable pointer to a patient's progress. Why then is it so seldom used in medical diagnoses? Dr. Kjerstin Ericsson provides an extensive bibliography to show how the graphic trace

has been used in diagnostic work with patients suffering from senile dementia. She illustrates an imaginative use of graphic tests in her native Sweden in assessing elderly patients' ability to look after themselves. It is to be hoped that her work may inspire others to use the written trace for diagnostic and assessment purposes in their own fields.

My own contribution combines two of my main areas of interest, educational research and what might be termed rehabilitation. A non-medical perspective of writer's cramp first links early teaching attitudes and lack of postural training to a more serious condition later in life. The wider implications of the act of writing are discussed, suggesting how writer's cramp may differ from other industrial movement disorders. This approach aims to encourage the medical profession to reconsider its views on rehabilitation—and take into account the contributory causes of the particular condition under discussion.

AREAS OF CONFLICT IN HANDWRITING

The personal quality of handwriting is raised in several instances throughout this issue. It is not only the effects of such individuality, but the inevitability and desirability of personal differences that are stressed. Once it is accepted that handwriting is a reflection of the writer on paper, then the perspective shifts: in research, in diagnosis and in educational planning.

The perception of writers through their writing, whether assessing senility, a psychiatric disorder or neurological impairment, may still be an unfamiliar concept to many doctors. It requires considerable application to analyze and interpret the written trace. At the same time, the writers' perception of themselves should not be forgotten. Whether it is ill health, immaturity, frenzy or perhaps just laziness that is mirrored in a personal handwriting, certain messages would be evident both to reader and writer. Some of these indications may be more distressful to the writer than to anyone else, causing them to seek remedial help. Where the writing problem is a reflection of the writer's condition it cannot be "cured" by cosmetic techniques such as trying to copy a new model. The root cause needs to be

diagnosed and explained before there is a hope of any real improvement.

When the same attitudes are related to education, a whole range of other issues are raised. Teachers' (and parents') perception of children through their writing cannot be ignored. Judgments and criticisms are made that can harm pupils' self-confidence and with it their ability to relax and progress in a satisfactory manner with their written work. Where many of these judgments are colored only by a measure of "neatness" or by how well children may be following an arbitrarily-imposed school model, even more problems are likely to arise. Handwriting models arouse strong emotions. There is a proliferation of proponents for a wide variety of different letterforms, all aimed at being "the ideal solution to handwriting problems." The need for a model in the early stages of handwriting is not questioned. The questions that really need addressing are: first, how soon a model should be dropped to enable the writer to develop a consistent personal hand; and second, what are the long-term effects of imposing certain (or any) models longer than absolutely necessary?

Handwriting and typography are two different letterform issues, so the criteria applied to one may not always be relevant to the other. Typographic letters need only to consider the reader. The writer, however, needs as much consideration as the reader when it comes to handwriting—a fact that is often ignored. Standardization in handwriting may, in certain circumstances, suit the reader, but the pressure for identical handwritten letterforms can only disadvantage the majority of writers. If teachers were to analyze what is illegible, rather than the other way around, they might come nearer to an understanding of the subject. The few points that make a handwriting unreadable do indeed need dealing with, but these are seldom aesthetic points. They are more often concerned with the movement, height differentials and spacing of basic letters.

EDUCATING EDUCATORS ABOUT HANDWRITING

Returning to a point made earlier in this introduction, the

narrowness of much educational research continues to contribute to the school policies that allow handwriting problems to arise. What actually happens in our schools? Details of how handwriting is taught or groups' or individual children's actual performance come very high on the list of subjects that we know little about. Sassoon (1988) looked at the effects of different models and methods on how children learn to write, but had to start by evolving simple ways of analyzing handwritten letters that might inform those whose training did not include the specialist knowledge of letterforms. The same body of work included a critical review of recent educational research. It revealed work that used inappropriate tasks and inadequate samples to provide "norms" of various aspects of handwriting. It revealed examples that had been copied by adults to resemble school children's work, in papers that have considerable influence on educational policies. It also revealed an unfortunate tendency for some of these questionable papers to be repeatedly quoted while others with less sensational or popular findings, but based on more thorough research, were consistently ignored. Perhaps the most worrying finding in this review was how researchers frequently depended on subjective judgments of "legibility" to justify their hypothesis or preferred model. When more closely investigated, many of these judgments appeared to have been made more on aesthetic criteria than on actual factors that affect legibility.

All these somewhat emotive points need to be seen in perspective (and are discussed at length in Sassoon [1988] for those who want further details). However, with these points in mind this might be a good time and place to give a few pointers for those whose work requires that they depend on the findings of handwriting research for educational planning.

SOME QUESTIONS FOR THE READERS OF RESEARCH PAPERS TO ASK THEMSELVES

1 Does the task that the pupils were given bear any relevance to the tasks that you expect to be undertaken in the circumstances in which you work? In a classroom situation, "writing" combines various cognitive functions—spelling, grammar and creativity—with the act of handwriting. So, for example, a task

consisting of a short phrase repeated over a period of time to yield a "norm" may be misleading. A task that involves a lot of copying may measure writers' copying capacity, not their motor skills; likewise, results from a dictated task may be influenced by the hesitancy or fluency involved in varying spelling capabilities.

2 How specific are the criteria, and are they relevant to you? Was it undertaken in your country or elsewhere? If so, was the educational policy similar to your own? Do the pupils start their education at the same age? Wherever the study took place, did the attitude to models and methods resemble that used in your school/district/country? Is, for instance, the balance between the expected creativity of content and the aesthetic appearance of written work similar to yours?

What method of analyzing the details of letters is used? Are you satisfied that the details investigated, however impressively they are quantified, would be relevant to your conditions? Are terms defined accurately or used in the same way that you would employ them—for example, such loose and subjective terms as "cursive"?

3 Does the study consider only the written trace or does it also look at how the trace was produced—i.e., taking into account such matters as paper position, penhold and posture?

4 Does it take into consideration the degree of training involved? Conclusions can be misleading if drawn from situations where either little training has been given so poor strategies are evident, or alternatively, particularly thorough training has been given. When information has been gathered from questionnaires, there is a further point to consider. Where only a stated proportion of questionnaires has been returned, readers should ask themselves whether the findings from such work reflect only the most concerned teachers rather than a representative sample of those approached.

5 Does any work that tries to justify a particular model or method look at the long-term effects of such teaching. If the study cannot, for whatever reason, be longitudinal it should

attempt to show how pupils with similar training have managed later on in their school life in particular, how they have managed to personalize their letterforms to deal with stress and the increased demands for speed.

6 By what means is the final product assessed? In particular, it is advisable to be wary of "legibility" assessments, which tend to be subjective, however impressive the test and retest results may appear. Legibility is likely to be in the mind of the reader and dependent on many factors, such as expectation, familiarity, personal training and tastes.

Unfortunately, handwriting is often taken for granted, and its complexity as a task is ignored by many of those who profess to be experts in one aspect or another. Modern technology enables us to investigate some areas of writing in great detail while leaving other equally important ones unexplained. Something that many of us depend on every day of our lives is perhaps less understood today than it was a hundred, or maybe even several thousand years ago.

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BIOGRAPHY

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WHO ON EARTH INVENTED THE ALPHABET?

ABSTRACT

There is neither record of nor reference to the invention of the alphabet in any known source. That in itself may say something about the invention—that it probably did not take place in the scribal community. The alphabet grew out of the syllabaries which preceded it, of which the most widespread were cuneiform and hieroglyphics. It probably emerged from the commercial communities of the ancient Near East but owed its consonantal principle to the Egyptians. A Canaanite in north Syria around 1800 B.C. is the most likely inventor, and the city of Ebla is taken as a hypothesis. The early Mesopotamian scribal tradition of which Ebla was part is outlined.

Opinions about how the alphabet was invented are considered, concluding that it was probably a single "giant leap," and by one man. The inventor's necessary background, creation of letter shapes, the writing medium and direction of script are reviewed. For the tricky problem of initial acceptance and diffusion, for which there is no evidence, a possibility is postulated. At the end, the whole process is encapsulated in a brief story.

INTRODUCTION

Few of those who speculate about the origins of the alphabet consider in detail the likely process of invention. Those who do, generally present it as complex when it is basically simple, and ignore altogether the really difficult problem of initial acceptance and diffusion. For a thousand years before the alphabet, the scribal schools in Mesopotamia and Egypt had studied and taught their scripts, cuneiform and hieroglyphics, but no record of the original alphabet or any reference to it has been found among the hundreds of thousands of tablets from the scribal archives. The silence in which the origin of the alphabet is shrouded invites comment but receives none.

Much has been written about whether the inventor lived in north Syria, Sinai or south Arabia, but almost nothing about whether he should be sought within the scribal or the commercial community. Had his invention been accepted in the scribal world, their records would surely have revealed it. Their silence suggests that either the invention did not take place in a scribal context or it was dismissed as irrelevant.

Writing emerged from trade. The vast majority of the surviving early tablets are commercial or economic records, so there ought to be nothing surprising in the hypothesis that the invention and diffusion of the original alphabet took place in a commercial setting, and probably in defiance of the scribal community.

Cuneiform, hieroglyphics, and the other writing systems in existence immediately before the alphabet, were syllabaries. Was the transition from syllabary to alphabet evolution or a leap? One writer who considered this question presented his argument in the form of a story (Millard 1985), and so provided this article with a precedent.

The first part of this paper will review the geographical, historical and scribal background to the invention of the alphabet, while the second part will consider the bases on which a new hypothesis for that invention might rest. Then, following precedent, the invention and initial diffusion of the alphabet are presented in the form of a short story.

If a single lesson emerges from this discussion, it is that creativity in the development of writing technology should be sought in the marketplace rather than the schools.

THE GEOGRAPHICAL, HISTORICAL AND SCRIBAL BACKGROUND

The alphabet could have been invented in Ebla or one of its surrounding villages. Midway between modern Aleppo and Hama in north Syria, Ebla was an independent city state. Despite being destroyed twice, it survived as an important commercial and cultural center from the middle of the third milennium to about 1650 B.C. when it was invaded by the Hittites. They may have obtained the cuneiform script from captured Ebla scribes. The population of Ebla, with its outlying towns and villages, has been estimated at 260,000 people (Bermant and Weitzman 1979, 153).

Although in north Syria, Ebla was within the Mesopotamian tradition. About eighty per cent of the words on tablets found in Ebla are Sumerian words (Walker 1987, 40). Over 14,500 cuneiform tablets had been excavated from the main palace in Ebla by 1977.

Among the ancient tablets of Sumer are numerous words lists containing, for instance, the names of animals, or of plants, or legal terms, and many others. Some word lists are bilingual, giving the Sumerian words with their Akkadian or their Eblaité translations.These classified lists of words were used as reference sources in early proto-science and as teaching material in the scribal schools. Scholarly exchange between Ebla and Mesopotamia has been established, to take one example, by more than a hundred word lists in Sumerian found at Ebla that are identical with word lists from cities in Mesopotamia (Bermant and Weitzman 1979 p157).

It is relevant to the supposition that Ebla or its region may have produced the alphabet that Ebla had a large and famous scribal school which attracted foreign students. It is also relevant that during the Old Babylonian period, 2000-1600 B.C., Egyptian influence pervaded north Syria, emanating from their trading

center at Byblos (modern Beirut), which for much of the time was an Egyptian dependency.

THE SCRIBAL SCHOOLS

Our knowledge of the ancient schools comes from excavations in Mesopotamia. School buildings have not been positively identified, but the concentrations in which school tablets have been found suggest that some, at least, were conducted in private houses (Sjoberg 1975, 176-7). Chiera (1975, 165) says that "scribes who could be depended upon to teach were scattered everywhere, even in small towns," but that only schools near or in the great temples could offer science or literature.

The scribe was not just a writer but a trained professional in many fields. Writing lay at the root of the school curriculum, and if it took as long to master cuneiform as it does today to acquire a good knowledge of reading and writing English (Chiera 1975, 165), a six-year curriculum could be a fair guess. By Old Babylonian times, Sumerian was no longer spoken, but it remained the language of literature and learning (except for mathematics which, in Mesopotamia, was taught in Babylonian [Walker 1987, 35]). The learning of cuneiform and of the Sumerian language went hand in hand. They would predominate during the early school years.

Other subjects included mathematics, surveying (land and quantity), music, literature, creative writing, identifying quotations from established texts, legal and other technical terms (Sjoberg 1975). Although many schools were attached to temples, the school curriculum seems to have been secular, though the gods were revered and religious literature was studied, even written, in the schools. Corporal punishment was used (Kramer 1949).

Schools catered, broadly, to what we would describe as upper middle class boys (Kramer 1981, 5). The teaching method emphasized memory training and the acquisition of knowledge through copying word lists, law codes and traditional literature, and by learning their contents (Kramer 1981, 6-7). Much of our knowledge of the ancient languages, literature, laws and mathematics comes from copies of documents made in their schools.

The law code of King Hammurabi of Babylon, 1792-1750 B.C., (Oates 1979, 200) is on a stele now in the Louvre. It is one of the few originals of an early law code to have survived and may well have been one of the law codes of which copies were studied in the school at Ebla. The code itself is undated, but the list of Hammurabi's regnal years gives year two as, "He established justice in the country" (Pritchard 1950, 269-70), and this is held to date the publication of his law code to the second year of his reign, i.e, 1790 B.C.

WRITING BEFORE THE ALPHABET

Pictographic records including numerals have been found widely in what are now Syria, Iraq and Iran dating from the late fourth millennium B.C., but writing able to convey the structure and grammar of a language emerged in Sumer and Egypt around or shortly after 3000 B.C. That was over a thousand years before the invention of the alphabet.

Sumerian cuneiform and Egyptian hieroglyphics had both started as pictorial scripts, cuneiform probably first by a short margin. By 2800 B.C. cuneiform had developed standardized signs for syllables and settled into the form which lasted for nearly three thousand years.

Cuneiform was not built for speed. The medium of stylus into clay virtually precluded the development of cursive scripts such as the Egyptian hieratic and demotic which used brush or pen or papyrus. The syllable sha (pig), for example, required seventeen marks, though six would probably be a fairer average for one sign. One sign could represent several sounds, and one sound could be represented by different signs. Although easier in practice than it appears in print (Walker 1987, 17), it would still seem difficult for the writing of cuneiform to become automatic. Cuneiform had about six hundred signs in normal use. Sumerian schoolchildren had quite a lot to contend with.

In Egypt, a pictorial script came probably a little later than in Mesopotamia, but heiroglyphics appear around 3000 B.C. It was a sacred script for formal religious or monumental use, of the

greatest beauty but cumbersome to write—or read. The hieroglyphs were used as ideograms, phonograms or determinatives. Ideograms by themselves were ambiguous, so they were accompanied by a second hieroglyph used either phonetically to indicate pronunciation or as a determinative to indicate the category in which the first heiroglyph was to be understood.

When used phonetically, hieroglyphs recorded only consonants, not vowels. Vowels were, of course, important and were pronounced accurately when the script was read, "whch s nt vry dffclt" provided you know the language. There were originally 99 but later 105 phonetic indicators covering the consonantal sounds (Diringer 1962, 49).

Hieratic grew up alongside hieroglyphics or only slightly later. It was a cursive script which simplified the drawn hieroglyphs and introduced ligatures but made no change in the structure of the script. It was clearly designed for priests in a hurry.

Demotic came much later, around the seventh century B.C., and did for hieratic what hieratic had done for hieroglyphics: it opened the script to a wider public but made no change in its cumbersome structure, which continued to consist of ideograms, phonograms and determinatives. It was not an alphabet, yet it arose a thousand years after the alphabet had been invented. It is hard to believe that the alphabet was an Egyptian invention.

After 2000 B.C. new scripts, all syllabaries, appeared in the Eastern Mediterranean region: Linear A and B in Crete and a related linear script in Cyprus, Hittite and Minoan hieroglyphics, and a form of hieroglyphics in Byblos. The Phaistos disc may have been an experimental script which failed (Millard 1985, 39l).

The alphabet was probably invented during the second half of the eighteenth century B.C., a period of experiment and of attempts to break away from the rigidities of the traditional syllabaries. No record of this first alphabet has survived.

Alphabetic inscriptions have been found in Syria/Palestine dated around the eighteenth or seventeenth century B.C., in Sinai around the sixteenth century B.C., and in South Arabia around

the tenth century B.C. Their similarities point toward a common but lost ancestor. These chance finds do not establish where and when the alphabet was invented. Diringer (1962, 120) and Naveh (1982, 42) consider north Syria or Palestine to be the most likely area of origin and the later eighteenth century the most likely time; Millard (1985, 394) concurs in the inventor being a Canaanite scribe but places the invention slightly later, during the second quarter of the second millennium B.C. Driver (1976, 196) gives the invention of the alphabet to the western Semites and points out that South Arabia is unlikely to be the source since the names of some of their letters are north Semitic, while Sinai is unlikely because the Phoenician script is not derived from the Sinaitic.

BASES FOR A NEW HYPOTHESIS

Nobody has demonstrated a necessary relationship between the shapes of letters and the sounds they represent. Some letters were derived from objects whose initial phoneme, or whose main phoneme, was the sound represented by the letter, an acrophonic association that may have made it easier to remember the original letters at the time of their invention. But an acrophonic relationship with familiar objects is neither necessary in theory nor used in practice. For example, how many people know, or ever knew, the objects from which our letter shapes may originally have been derived? Letter shapes could as well have been chosen at random, and some probably were.

In theory, an alphabet has one sign for one sound; in practice, not always. In English, one sound may be represented by more than one sign (e.g., "cage," "king"), or one sign may represent more than one sound (e.g., "a" in "lame" and in "lamp"), or more than one sign may be needed to represent one sound (e.g., "-ng," "th," "ph"). But English still has an alphabet.

SOME VIEWS ABOUT THE ORIGIN OF THE ALPHABET

When discussing theories about how the alphabet may have arisen, we must ask whether a particular theory considers that the transition from syllabary to alphabet was a step-by-step

progression or a single leap, and whether the theory describes the process of invention in any detail.

Moore and Lambdin (1960, 21) conclude that the alphabet had its beginnings in an acrophonically-derived script under direct or indirect Egyptian influence somewhere in Syria or Palestine, and that a script in which a single sign represented a consonant plus a vowel "(even zero vowel)" was a revolutionary innovation. This does not recognize explicitly that the acrophonic element relates only to the choice of letter shape, nor does it acknowledge that a set of signs representing consonant plus vowel is a syllabary, not an alphabet (even though one sign for one monosyllable is close to an alphabet, as Millard states). A leap is implied, but the process of invention is not described.

Diringer (1962, 112ff.) does not trace a detailed progression from syllabary to alphabet. He places the various scripts so far as possible in relation to each other and leaves it open that the transition from syllabary to alphabet may have been a single leap. He adds that the leap may have been accomplished by one individual. This present article owes part of its origin to Professor Diringer's forthright suggestion.

Driver (1976, 157ff.) considers the acrophonic principles by which particular letter shapes may have been chosen and concludes that no single system will account for all letters. On the central question of a progression or a leap, he is silent.

Naveh (1982, 42) considers that the alphabet was invented by Canaanites with a knowledge of Egyptian hieroplyphics and that most of the letters had acrophonic values, but he does not tackle the process by which the invention may have been accomplished.

Millard (1985, 394) does tackle the process in an imaginative story about how a Canaanite scribe might have set about inventing the alphabet—a precedent which this article will shortly follow. Millard's imaginary scribe lives in a mercantile center. He has been trained to write Egyptian with pen and ink on papyrus, and knows of cuneiform and other scripts. None of

these cumbersome syllabaries relates to his language, so he sets out to invent a syllabary of his own. Using the Egyptian principle of indicating consonants but not vowels, and profiting by the accident that words in west Semitic languages do not begin with vowels, he ends up with "a very economic syllabary" of signs for consonant plus vowel only. This is not an alphabet but, in practice, is virtually indistinguishable from an alphabet of consonants only. That is where the story stops. The reader assumes that at a subsequent stage the vowel element is held to have dropped off, leaving a true consonantal alphabet in place.

A step-by-step progression from syllabary to alphabet deserves some thought. First, it is conceivable from the point of view of the inventor but it is inconceivable from the point of view of its readers. Writers and readers form a single interdependent community. If the simple consonant-plus-vowel syllabary had gained acceptance, in the sense that each element performed a necessary function, the vowel element could not just have been abandoned without undermining the script.

Second, the distinction between syllabary and alphabet may be narrower than many people suppose because an alphabet is almost bound to contain at least some syllable-like elements (Harris 1986, 38-9). For instance, it is impossible to pronounce the consonants "b," "d," "g", "j", by themselves without adding a vowel-like sound. The vowel-like sound "b-," "d-," etc., is not specific in the way that, say, "ba" or "do" is specific. That is why "ba" and "do" are syllables whereas "b-" and "d-" are not. But "b-" and "d-" bear a family likeness to syllables which, at least in their case, would make a step-by-step progression from syllabary to alphabet rather less likely and a leap rather more likely.

A third observation is that alphabets generate rules for their use. In English, these rules include "normal" spelling and letter clusters which indicate sounds additional to those indicated by single letters (e.g., "-ng," "sh," etc.), and "special" spelling to reflect etymology and therefore meaning (e.g., air, heir), among many other rules. So would the inventor of the alphabet have needed to discover rules for its use as part of the invention process? From

the variety of practice before and in the early days of printing, it is clear that many of the rules governing the use of the English alphabet evolved long after its introduction and were often created by printers. The few and short surviving inscriptions in early alphabets preclude generalizations about rules, but they do not contradict the supposition that the original alphabet consisted of perhaps twenty or thirty signs but no additional rules for its use beyond the given relationship between sign and sound.

With the distinction between syllabary and alphabet narrowed and the invention of the original alphabet requiring no more than the production of one sign for one sound, the hypothesis that a bright young man might have leapt the gap between them becomes tempting. Diringer (1962) envisaged it, and this article will follow Diringer.

The bases on which our hypothetical invention of the alphabet rest are that the alphabet was invented at a single leap, that the original alphabet had no vowels, that most letter shapes were derived by acrophonic association from the names of familiar objects but that some were chosen at random, and that the first alphabet was written from right to left like hieratic (normally) whereas cuneiform was written from left to right. Finally, there is a solution to the difficult problem, which no one appears to have recognized, of what the inventor is going to do with his alphabet immediately after he has invented it.

The inventor's necessary background: Was the inventor of the alphabet an Egyptian or a Canaanite?

An Egyptian in north Syria would be no stranger at that period, but it is not obvious with whom he would be trying to communicate. It could hardly be family, friends or business colleagues in Egypt because they could not have read the alphabet until they had been taught; and they are unlikely because the ancient Egyptians never adopted an alphabet but evolved a daily cursive script, demotic, a thousand years after the alphabet's invention. The Egyptian-speaking community in north Syria would have been possible correspondents, but the same objections apply to them though with less force. Canaanite friends and colleagues in

north Syria? They, too, would be unable to read his alphabet until they had been taught, but far more important, it is hard to accept that the first alphabet could have been invented for a language foreign to the inventor. The possibility of an Egyptian inventor cannot be eliminated, but a Canaanite trained in cuneiform and acquainted with hieroglyphics is the more likely person, as suggested by Millard (1985, 394) and others.

The Canaanite inventor would have needed scribal training in cuneiform and sufficient acquaintance with hieroglyphics (or hieratic) to understand those principles peculiar to hieroglyphics which would be necessary to the alphabet he was about to invent. They are: the principle of a consonantal script, which is fundamental; and the acrophonic use of signs, which would help in the selection of letter shapes. Both principles could be absorbed in an hour by an intelligent schoolboy in contact with a proficient writer of hieroglyphics.

A consonantal script immediately provokes consideration of the different functions of vowels and consonants. Our inventor, looking for a better writing system and acquainted with the consonantal principle within hieroglyphics or hieratic, would recognize that consonants identify roots while vowels, in addition to their grammatical importance, convey meaning by intonation and expression. Consonants can easily be indicated, but the variable and subtle nuances of vowels defy codification. But he would not have to discover the consonantal principle, only recognize and then exploit it.

Our inventor must not be too learned. An elderly, experienced scribe conscious of the subtle construction of syllables will worry over detail and surely stumble. A younger man will be more likely to seize the consonantal principle and find that he has leapt into alphabet when he thought he was taking only one small step.

CHOOSING THE LETTERS

What matters about letters is that they should be distinct from each other and their association with a given sound should be easily memorable. The acrophonic principle would be attractive

initially, though it would not be used once the letter had been learned. The inventor would be likely to draw on his knowledge of existing pictorial associations when choosing letters, but a number of random shapes would creep in.

THE WRITING MEDIUM

It was the clay medium that prevented cuneiform from developing its own cursive variants. The alphabet set the cuneiform world free from that constraint being easy to write with pen or brush. Papyrus was scarce and expensive in north Syria, and wood inconvenient to handle; but leather was plentiful. That the first alphabet might have been written with brush on leather is a supposition for which evidence either way is unlikely to be found.

DIRECTION OF SCRIPT

The surviving early alphabets were usually, though not always, written from right to left, which suggests, but only suggests, that the original alphabet may have been written from right to left as well. This would have accorded with the main Egyptian tradition but have been contrary to the main cuneiform tradition in which our supposed inventor had been trained. Why the apparent anomaly? One possible reason is that the inventor of the original alphabet may have wanted to identify his new script as quick and cursive by association in direction, as well as in its consonantal principle, with hieratic (Millard 1985, 395); and he may have welcomed the contrast with cuneiform, whose supremacy was being challenged. The thought that the inventor may have been left-handed is not pursued in this article.

THE PROBLEM OF ACCEPTANCE

An intriguing question is how the alphabet managed to obtain initial acceptance and so enable the process of diffusion to start. For a thousand years, scribal communities, or the scribal community, had enjoyed a monopoly of the written word. Daily operating accounts, business contracts, the bureaucracy of government, historical records, literature and religion were all preserved in a writing system so complex that only a trained scribe could use it. Even if the scribes had been willing to surrender the source of their economic and social status, the weight of the archival

records would not easily have allowed them to do so. It is not surprising that cuneiform continued in (diminishing) use for some eighteen-hundred years after the invention of the alphabet, the last cuneiform document to have been found being written in 75 A.D. (Walker 1987, 17-18). It is unlikely that the scribal community would have invented an alphabet or, if a scribe had done so, have permitted its adoption.

Writing was the child of trade. It was the merchants who evolved those early trade marks and numerals which identified goods and quantities and opened the door to the written message (Schmandt-Besserat 1981). The stage at which scribal communities began to standardize a script is unknown, but the earliest formalization of pictorial signs suggests the work of a coordinating interest. Perhaps the most dramatic illustration of interaction between writing and commerce is found in the later story of Aramaic. During the eighth century B.C., the Assyrians transported large numbers of Aramaeans from their kingdoms around Damascus to Mesopotamia where they spread the Aramaic language and its alphabetic script. When the Aramaeans became the merchant class of the Near East, Aramaic, aided by its alphabet, became the lingua franca (Diringer 1962, 134 and 138).

A commercial, as opposed to a scribal, setting would seem appropriate for the invention and initial diffusion of the alphabet. Our supposed inventor is called Azi because it was an Ebla name (Bermant and Weitzman, 1979 156). Azi, of course, knows his cuneiform and invents the alphabet at a time of fury and frustration. Initial acceptance and diffusion are given to a commercially-motivated urban sub-culture of boys not attending scribal school. They quickly grasp the new alphabet, and exploit one of its immediate possibilities by running an urban postal service of their own. This pays the boys, serves the commercial interests of their parents, provides an immediate market for the spread of the alphabet and cocks a snook at the scribal establishment.

The sons of visiting merchants know a good thing when they see one. They copy the letters. Alphabetic writing is then imagined

as appearing in Ebla's neighbor and contemporary city Carchemish, about one hundred miles to the north, where the scribes are no more enthusiastic than they were in Ebla.

THE INVENTION OF THE ALPHABET: THE STORY OF AZI

Nor should we exclude the possibility that a single man was in fact responsible for the conceptual leap involved in the creation of this unique form of writing ....

David Diringer
(*Writing* 1962, 121)

The school was on the ground floor of an undistinguished stone house two doors down from the crossroads. School was in the front room where the boys sat cross-legged on the packed earth floor. Their master, an elderly scribe, was thin with a firm little mouth, wispy, graying hair and a precise manner. His shabby gown suggested that little work came his way apart from teaching these dozen or so boys how to write, most of whom could hardly afford the low fees which were all he dared ask. Not like Ebla, two hours walk to the west, where the temple school was for the rich and even a teaching scribe could charge almost what he liked.

The boys came to him for about four years. To begin with it was mostly writing and learning Sumerian, then reading and copying the ancient Sumerian texts and some modern ones like the laws inscribed by Hammurabi of Babylon only sixty years before. As their writing improved they turned to arithmetic and geometry, and a few might go on to the city for vocational studies such as law, accounting or land surveying. Some would end up as temple priests, but that had little to do with the school.

"I'm fed up with all this pedantry."

"Do you, Azi, the cleverest and laziest boy in the class, who never bothers to write even one cuneiform sign accurately, dare to talk of pedantry? Who can make sense of the scribbles you produce under the pretense of writing?"

"If it is lazy to want to write quicker, then yes, I am lazy. It

takes forever to make even one of these signs on this filthy clay, and all you ever do is thrash me because a single mark may perhaps be slightly in the wrong direction. The whole thing is slow, fussy, useless, and I hate it."

At this point teenage Azi flung his wet tablet at the scribe's head, missed, and the clay shattered on the wall behind. The stylus followed, and also missed. The scribe reached deliberately for his strap, caught Azi by the hair and administered yet another well-deserved thrashing.

"If you know better than the scribes of a thousand years, go make you own writing. Meanwhile you, Azi, the most brilliant boy I've ever taught, can take your idle self out of my school and never, ever dare to come back. The rest of you boys learn from Azi's example. Curb your temper. Understand that accuracy is another name for truth; discipline your minds to master the ancient skill of writing, and fit yourselves to serve your employers and your city."

Azi, weeping but still rebellious, slammed the door and limped home.

At this time of the day there was no one there. He lay in a corner, stunned by what he had done. That school had meant everything to his father. He was a merchant trading as far as Mari to the east and Byblos to the south, but never big enough to own his own caravans. He would have liked to send Azi to the school in Ebla, but the local scribe was all he could manage. Azi knew that his father's status as a village councillor owed much to his having a son training for the scribal elite. He had thrown his family away in a fit of temper, and in a few hours would have to look into his father's eyes and cringe.

He had been impudent, yes; but he couldn't accept that he'd been wholly wrong. This writing of a thousand years and more was slow, so pernickety. It took years to learn, and even then ages to inscribe the half-dozen or more strokes for each sign. Each syllable sign by itself could mean a dozen different things, so reading was nearly as hard as writing. Perhaps he was lazy.

He frowned ....

Still frowning, Azi moved to the front door and stood for a moment in the sunshine, pondering. How many sounds do we really make when speaking...? Well, how many do we...? He squatted and began to doodle in the dust. No, remember what the scribe Inena used to say when he showed me his Egyptian writing in the evenings: know your consonants and the sense will tell you the vowels. Inena never wrote his vowels. The Egyptians were right—they often were. The vowel sounds are innumerable and you could never write them all, but consonants are fixed and few. This should not be impossible.... He started again, this time tracing random signs for consonants. It's not so easy, he muttered, looking up, eyebrows puckered; we must have some way of remembering.... He traced more carefully a simple outline to suggest a house; "beth," he thought as he pronounced "b." That's more like it; now what for "g"? Then "d," quicker now as one after another he wrote signs which suggested the sounds of the consonants. If he couldn't think of any-thing, he drew a sign at random—no matter, you'd soon remember it once you got used to it.

This was easier than Inena's writing, but it was really Inena's idea. Azi was imagining ahead... he owed Inena a lot. This writing should always be associated with Inena; and it must be quite different from school writing with its fussy scribes. Why not...? This writing will go from right to left. He started yet again, this time right to left, and before the afternoon had started to cool, he had in the dust in front of his home the beginnings of his own way to write. He dashed inside to get a bit of leather and some of the color used for decorating pots, and came out to find the dog next door curled up on his pattern and slightly wagging the very tip of her tail. One kick and she slunk away, but half the patterns were gone.... What did it matter? He could remember most of them and re-invented the rest, and long before his father came home he had them safe on leather.

The next few days were grim. Turned out of his home, with only the street to sleep in, not one man in the village would give

him work. He had nothing to do. He stole to eat. Between times he looked at his leather and casually added new shapes for sounds he had not thought of before. Sadly, some days later, he packed his few clothes together with his leather and set out deep in thought for the city.

He slept on the corner of a busy street. In the morning he watched a group of smartly dressed boys on their way to a school who turned round at the taunts of some ragged urchins off to work in the fields.

It was hunger that did it. The second day he called out to a group of the poorer boys, "Hi kids, want to learn to write? Look at those wretches trailing off to years in a writer's prison for fees to beggar their fathers. I can teach you to write in four weeks flat. Like to see?"

A couple of them strode over and asked what he was up to.

"Four weeks to write, easy."

"Show us."

"Wait. Stay here for just one hour. If you can write your names in one hour, you pay for my dinner. If not, pay nothing. Is it a deal?"

They looked at each other. "It's a deal."

Azi ate well that day. The next morning there were a dozen, but he told half to come back in the evening. A couple of weeks and they were writing simple sentences, four weeks and it was whole messages.

They wrote to each other, of course, but one day the father of one of them told his son to take a message to a business partner on the other side of the city. A caravan was about to leave for Mari and his partner must go with it, taking a long list of goods. The boy grabbed a leather tab, wrote it down and ran. When the consignment was on its way, his father gave him a small piece of silver. After that, the boys would take messages from anyone who paid them, and plenty did. They carried the leather tabs across the city to read the message to the recipient, and sometimes they would

pass tabs to each other for delivery further off. Some began to teach their younger brothers, who grasped it swiftly and then joined in. The sons of visiting merchants picked up the idea. They copied the letters, and it was not long before rumors began to arrive of a similar enterprise in Carchemish.

Azi went to the school in Ebla and showed them his writing. They had heard what the boys were up to, and were very angry. "Are you trying to steal our livelihood?" asked one of them. But an older scribe said, "Well done, young Azi. Do you know that in the cellars of this building are thousands of ancient tablets with all the learning, all the history of our people? If we can no longer read them, our whole world will die when we do. Is that what you want?"

Two pairs of eyes met, one young, one old. Azi turned and walked slowly, pondering, toward the city. It would be the same in Carchemish, he had no doubt. The scribes would only ever look backwards.

Azi was eating well but he was homesick. He returned to the village. Still, neither of his parents would talk to him so deep was the disgrace he had brought upon them. Even his friends turned their backs and walked away, ashamed to be seen with him. He told no one what he had been doing in the city. He began to drink the barley wine, slept days as well as nights in the gutters and never noticed how foul his clothes smelled. When he fell ill no one cared, and one day the dog he had kicked was seen whining and sniffing at a small heap of rags by the roadside.

Only two or three came to the burial, among them the elderly scribe, Azi's former master. Before they placed Azi's body in the grave, the scribe stepped forward.

"Azi was a young man blessed with all the talents, more brilliant than any boy I have ever taught. What a shame, a tragic shame that he was always too lazy to develop his gifts. A sad, wasted life...."

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BIOGRAPHY

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QUESTIONED DOCUMENTS: THE HUMAN TRACE AS A BODY FLOW

ABSTRACT

Although handwriting has long been recognized as something entirely individual, it has not yet been the subject of true scientific and objective examination. This article tries to promote an interest in the scientific observation of handwriting. A methodical and complete description of each written document would allow researchers to solve identification problems, investigate group characteristics and bring forth new information in a number of different fields.

Could we find in handwriting something like DNA? That may seem a farfetched idea, but we know how individual handwriting is. Would it be possible to examine it scientifically as a body flow? We already study handwriting, or graphic production, with the help of neurology, computer science, other sciences, and literary or artistic studies. Writing considered as a means of communication, as a product of culture, as a form of art, is now highly investigated without being separated from the concept of language. Writing, then, is assumed as a conscious, intellectual, rational activity, the study of its disorders helping to define what is "normal" writing.

But is it always rational, intellectual, conscious? Let us try to forget what we know about handwriting; let us drop our cultural experience and imagine that we are looking at a writing person, without knowing what he or she is doing. What do we see? A leaning head, a moving hand, and something, of which we do not know the nature, seemingly flowing out of the individual's fingers and becoming a separate object.

Let us start with the little child trailing a wooden stick in the dust behind him and wondering about the magic trace it has produced. Let us start with the pictures upon cave walls: whatever the support, whatever the implement, man has found a way of producing something which apparently flows out of him, which comes directly from inside his body and stays after him as an individual token of his presence.

Let us consider handwriting, not primarily as a means of communication but first as an expression, as an exteriorization of the individual self happily discovering his ability to mark his passage with something as personal as his own blood.

Language, of course, has made writing more effective, allowing it to communicate complex thoughts and feelings but, at the same time, reducing it to a means, an instrument, a tool.

And yet, why do lovers in all times write their names and their love upon trees and monuments? Why are most anonymous letters written by hand (while typewriters, newspapers, scissors are easily available)? Why are our urban walls covered with graffiti?

Examiners of "questioned documents" (documents whose authenticity is suspect and under investigation) have seen many a criminal case in which, having stolen or killed, the guilty one had also written, although it was not necessary nor useful, involved a serious risk and finally allowed him to be identified. Why such incautiousness?

These examples show that inscriptions are not only nor primarily a means of communication, but an internal necessity to expel intense feelings, conscious or unconscious: love and hate, greed for power, desire to destroy. Graffiti, when they have a meaning, are created as an attempt to get attention from a world which does not listen, which is felt as deaf and blind. And when there are no words, is it not the aim, conscious or unconscious, of the authors to occupy the available space, all the available space? In fact, "writing," whether or not it uses a language made of words and signs, is the result of a deeply rooted need. And if we consider it as flowing out of the individual, as growing out of a need to expel something, as a means to mark a territory, then we can consider it as a body flow.

Body flows have been studied extensively in the last decades. We have learned about the vast information they give, which allows positive identification in many cases. So does handwriting. And handwriting has a definite quality: it is durable. It is still possible to examine inscriptions which were made centuries ago. Whether people have been dead for a long or a short time, we can study the written documents they have left, which represent a yet untapped source of information, and (like body flows) not only for identification purposes. The information is there. We have to find out what we can do to extract it from the material we have.

While other scientists are studying the process of handwriting production, we have to tackle the problem from the other end: the examination of the finished product. And if we consider it as important, as individual as a body flow, then we have to give it a full scientific treatment—that is, accurate observation. Like the primitive man who knows how to "read" in the woods the

traces of animals or humans, we have to develop a power to observe precisely what we see.

A scientific observation should be done without a narrow purpose. The only way to observe accurately is to examine without any preconceived idea or special aim. Such an observation of handwriting is, in fact, what examiners of "questioned" documents do in their work which concerns identification, and identification only. We have to examine and to compare without any consideration for the text, the psychological aspects or the circumstances. This is the only way to solve accurately these police or justice problems. For instance, if we have to study anonymous letters and writing samples of several suspects, we must not consider their different personalities. The author of the letters is not necessarily the least sympathetic of the writers. In the same way, forgery detection can be done only if we know how to look at and examine a document—if we are aware of the possibilities and limits of willful transformation and are able to find out through disguised or imitated handwriting the natural characteristics of the real writer.

This is not graphology as it presently exists. I am very definite about that. Graphology experienced a valuable start. Many remarkable works were written, especially during the first half of the century, before World War II. Crepieux-Jamin, Pulver, Saudek, Klages, Hegar, Jacoby, among many others, have brought forth new and valuable notions.[1] Unfortunately, graphology has suffered since then the worst kind of vulgarization. As it developed a commercial appeal to the general public, books began to be published that gave subjective or false interpretations. Anybody now can buy such books in the unscientific hope of knowing everything about their neighbor without the embarrassment of questioning. Different training programs, mostly through commercial organizations, have multiplied the number of "graphologists," and the professional associations which should have exerted control over the qualifications have not always succeeded. The result is that the competent professionals are outnumbered by quacks or imprudent consultants,

and graphology does not any longer enjoy the consideration rightly gained by its first promoters.

From its very beginning, graphology defined a proper pattern of handwriting observation, considering writing not only as a shape but as the result of a movement. The methodology rests on a few basic principles:

- to examine without reading,
- to look at the entire document, never forgetting the global view,
- to study the general characteristics, that is to say, layout, size, slant, baseline, connections, pressure, velocity, spacing—the shapes of letters coming at the very last, rather as an illustration.

It should not be necessary to adopt a peculiar terminology for graphology: our aim is to keep the language of handwriting observation as simple as possible, to be understood by any unprejudiced person and not only by specialists. Handwriting observation should be taken into consideration as a still-untapped source of information by scientists in many fields: medical research, sociology, history and paleography would be enriched by a methodical and objective examination of written documents.

What has been learned in the past decades about visual perception shows that one sees only what one expects to see. So it is a mistake, in my view, to teach graphology by teaching both observation and interpretation at the same time. Those are two entirely different things. When we have learned to give a special significance to any graphic feature, we unconsciously choose to see (or not to see) according to what pleases us most or suits our preconceived ideas. This is the source of many graphological errors.

We have to separate observation and interpretation. Interpretation itself can always be discussed. It is not a scientific process (at least, not yet), and opinions may differ. But an observation precisely stated can always be verified (or contradicted) by comparison with the original. We might train good professional graphologists if the aspirants were obliged to study handwriting observa-

tion for two years before starting to learn the possible significance(s) of what has been observed.

To look is not to see. To be able to observe a written document properly, we must have a minimum of scientific, cultural and artistic education:

Scientific: We should have basic information about
- visual perception, optical illusions (which should develop the ability to appreciate proportions correctly,[2]
- neurophysiology of handwriting production (respective roles of brain, eye, hand), and the possible changes in handwriting induced by a change of instrument, the use of the untrained hand (foot, mouth) and the effects of age and illness,
- research in computer science about handwriting recognition.

Cultural: We should know about the teaching of writing and its practice, especially in the time and place corresponding to the document we have to study. Handwriting changes. In each country, each generation has its own handwriting. It means the interpretation cannot be universal unless it is, at the same time, general and flexible. The individual has to be considered in a social and cultural environment. We cannot, for instance, grant to a graphic feature in a modern handwriting exactly the same meaning it had at the beginning of the century, when social conditions were different.[3] It is not necessary to be able to read the text of the document. In fact, it is very good training to examine documents written in a language one does not understand (even in a different alphabet): it allows pure observation and prevents the student from being influenced by the information contained in the text.

Artistic: Seeing paintings in museums and exhibitions and learning to appreciate art as a critic is a valuable asset in handwriting observation.[4]

Naturally, each step should be completed by practical exercises added to the theoretical learning, so that we can understand our own process of visual perception and enlarge it as much as possible to enable us to observe as precisely and accurately as

we can. Only then is it possible to reach a complete and correct observation of the written product. And once we have done this, any untrained person can verify what we have described because once it has been shown, it becomes apparent for everybody.

The examination of questioned documents to ascertain the writer's identity should be done in this way. Only a complete description of each handwriting can be the basis of a correct comparison. The full description of any written document can be compared to a genetic sequence: you cannot properly compare two sequences if one element is missing.[5]

Technically, a complete observation cannot be made without special training. But there is another reason which prevents us from seeing everything there is to see. It is difficult to look at handwriting with an open mind: first, because we are used to reading words and phrases expressing a message which is immediately intelligible; and second, because it contains an emotional element. Of course we feel a special pang when we recognize the handwriting of loved ones, but even when we see a written document for the first time, we almost immediately have an impression which is purely sentimental: sympathy or antipathy, which makes us feel this handwriting is beautiful—or is not.

This is probably why so many people are self-conscious about their own handwriting—which would seem to contradict what we said at the beginning of this article, but does not really. Being afraid is the result of experience, while the need to write belongs to some primitive instinct. Even the person who says he or she has a "bad" handwriting writes instinctively when lying on a beach, with a finger on the sand, erasing it afterwards and writing again.

That self-consciousness deserves our attention. On many occasions, it is due to the misunderstanding of teachers and family. Society makes people think that a "beautiful" handwriting is very regular and stable. But that is not exactly true. The mechanical, stereotyped handwriting in some mental illnesses is evidence of the condition. Although it is not very easy to explain the difference between elegance, conventionalism and vulgarity,[6] it is

possible to show that the small (or larger) irregularities in handwriting are mostly due to the fact that you are a living person: breathing, acting, sensitive to circumstances and emotions. Whatever the reasons, one should never apply a judgment upon handwriting: like a body flow, handwriting has to be accepted as part of the individual.

Handwriting, indeed, is not just a fixed image but something which has a life of its own: it comes from an individual who is not only living, but acting. Often enough, one hears people say, "My writing changes; it is quite variable." But our handwriting, like ourselves, does not change fundamentally; it reflects, more or less, like our face, our physical and mental state. Happy or sad, energetic or tired, our mind concentrated or just dreaming, we are also vulnerable to the effects of time. Here again, a correct observation of different samples allows one to distinguish the permanent features from the temporary ones.

To treat handwriting as a body flow, deserving a truly scientific observation, we have to forget what we know about letters and words, to get rid of our feelings, to prepare our mind and our eyes to see just what there is to see and everything there is to see, from every possible angle: to describe, to show, to verify and to capture objectively the breath of life, present in every script. This is not easy. It is one thing to look at a sitting duck, and another to look at it flying. But it is rewarding: when we can explain and communicate, when we can show—then it is possible to share our experience and allows others to go further on. A scientific examination of handwriting considered as a human trace, as a body flow, opens a vast field of research: collecting handwriting, collecting observations, and confronting them with what we know about the writers, allow us to define group characteristics, make accurate comparisons and discover new information about the individual and about the group or any group.

Some of us can already recognize some national characteristics: there is, overall, a difference in the general aspect of American and European handwritings and, among the Europeans, a

certain variety according to different countries. We can recognize, too, the differences between generations: a page written by our parents or our children is different from what we write. Professional features are also identifiable: we can distinguish technical, administrative or commercial qualities among candidates' letters. In the same way, experienced examiners of questioned documents have noticed that anonymous letters have some graphic peculiarities in common.[7]

If we do not organize this on a scientific basis, this kind of experience is not transmittable. But we could make it completely objective, that is, available to any scientist, if we were to give handwriting the treatment which a body flow really deserves. It is essential that we keep a scientific mind. Our observations must be exact, complete and verifiable.

And let us remain modest. We are not bringing answers, but more questions. If we are able to show some constant features in a group, we do not know what the meaning might be. At most, we propose hypotheses which have to be checked and rechecked. Why, in some ancient Hebrew manuscripts, are some words written slightly larger than others? Here the paleographer may answer. Why do we so often see long, isolated commas in anonymous letters? There we may offer a possible interpretation which can be discussed by the psychiatrist. Do the differences in national handwritings correspond to national features of character? Does the roundness of Sinhalese writing, which has no angles at all, give one among other elements which might explain misunderstandings with Tamils? Can we establish a link between certain personal handwritings and art productions by those who have no art training and may be suffering from a mental condition?[8]

This list is endless. It opens large avenues of investigation and reflection, and it allows us to believe that although cultures are different, the human truth is one. Observing a graphic product as a body flow, we touch, under the cultural strata, the deep universal reality of the human being. Looking at the flow and analyzing its movement, we can learn about the living person

who existed centuries ago in other parts of the world; get a better understanding of cultural differences and their relative importance; give new tools to medical, sociological and many other researchers; find out what changes or impairs the normal and happy production of the human hand, and study the ways which may help the current of life express itself with freedom and grace.

ENDNOTES

[1] See the first chapter of H.J. Jacoby. 1948. *Analysis of Handwriting,* 2nd. ed. London: George Allen and Unwin.

[2] See R.L. Gregory. 1970. *The Intelligent Eye.* London: Weidenfeld and Nicholson Ltd.; Oliver Sacks. 1985. *The Man Who Mistook His Wife for a Hat.* London: Gerald Duckworth & Co.; and Glyn W. Humphreys and M. Jane Riddoch. 1987. *To See But Not to See: A Case Study of Visual Agnosia.* Hillsdale, New Jersey: Lawrence Erlbaum Associates.

[3] As an example, we may consider the baseline. The interpretation suggested by Michon and Crepieux-Jamin is that a stable baseline means rectitude; a very sinuous one, dishonesty. At the beginning of the century, religious and moral principles represented precise landmarks. Nowadays, when we do not have so many landmarks, my opinion is that a very stable baseline in modern handwriting would indicate prejudice: acting without questioning oneself.

[4] It seems necessary to read E.H. Gombrich. 1960. *Art and Illusion.* Princeton, New Jersey: Princeton University Press and *The Sense of Order.* 1979. Oxford: Phaidon Press Ltd.; Francis Haskell and Nicholas Penny. *Taste and Antique.* New Haven: Yale University Press; and Francis Haskell. 1976. *Rediscoveries in Art.* Oxford: Phaidon Press.

[5] This is why, unfortunately, different people give different opinions on the same case, and this is the source of errors. However, the comparison of a questioned document with the genuine one needs a second step, which is even more complex. Once we have done a correct description of each document, we find differences and similarities. But these differences and similarities do not have the same value, so the comparison should be completed by an accurate analysis of the results.

[6] The study of calligraphy is very interesting from this point of view: we sometimes see calligraphers' works which are technically clever and yet fail to be harmonious. See Dr. Rosemary Sassoon and G. SE Briem. 1984. *Teach Yourself Handwriting.* Sevenoaks, Kent: Hodder & Stoughton.
An interesting attempt at analyzing typescript has been made in the first chapter of Jan Tschichold. 1985. *Treasury of Alphabets and Lettering.* Hertfordshire: Omega Books, Ltd.

[7] The study of a number of suicide notes has shown a particular pattern. See M. J. Sedeyn. 1982. "Farewell Letters." *Hexagon Roche* 10, no. 2. The examination of ancient manuscripts allows us to think that we can differentiate the work of a scribe from that of the original writer. See M. J. Sedeyn. 1990. "Acte Mecanique ou Presence Vivante?" in *Bibliologia* 10 "L'ecriture, Le Cerveau, L'oeil et La Main, edited by Colette Sirat, Jean Irogoin and Emmanuel Poulle. Place of publication?: Brepols. It should be possible to recognize, without reading, the likely content of a text, whatever the time and place it has been written.

[8] The collections of the Museé de l'Art Brut, in Lausanne, Switzerland, deserve special study in this context.

BIOGRAPHIES

Susan Walker is a lecturer in the Department of Typography & Graphic Communication, University of Reading, England and a typographer with a particular interest in information design. Her research and publications in recent years have concentrated on ways of describing formality and informality in written language, and on house style conventions across a range of technologies. One of her interests is typographic education at school: both how letter shapes are taught and how children organize information on the page.

Michael Twyman is professor of Typography & Graphic Communication at the University of Reading, England, where he has been teaching for thirty years. His major research interests are in the history of graphic communication and the structure and conventions of graphic language. He has published articles on a wide range of topics, and his books include *Lithography 1800-1850, Printing 1770-1970* and, most recently, *Early Lithographed Books*. He has a special interest in the place of typography in education at all levels and has been chairman of the British Working Party on Typographic Teaching and the Education Committee of ATypI (Association Typographique Internationale).

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Visible Language Volume XXIV Two
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PRELIMINARY THOUGHTS ON NOMENCLATURE FOR TEACHERS OF HANDWRITING

ABSTRACT **This paper draws attention to the need for a useful nomenclature for handwriting and suggests sets of terms for use by those concerned with the teaching of handwriting and research into it. Reference is made to papers on nomenclature in the related field of printing types and to the recommendations of a study group of the Working Party on Typographic Teaching in Britain. Terms are proposed for categories of letters, the main parts of letters, descriptions of orientation, variant forms of letters, the real or notional lines associated with handwriting and ways of referring to heights. These terms are intended specifically for use by teachers and other specialists in handwriting. (It is accepted that good teachers will develop their own terms when working with young children.) The recommended terms are set out in a series of tables along with terms commonly used by different groups of specialists: teachers, writers of handwriting books, those who write about paleography and letterforms, and specialists in printing and computing. The terms used by teachers were gleaned from a small, uncontrolled survey. This revealed a reluctance or inability of many teachers to describe parts of letterforms and features associated with them and considerable variation in the use of terms. This survey suggested that a larger-scale project of a similar kind should be undertaken.**

"The absence of an accepted nomenclature was a stumbling-block for most (writing) masters. If technical terms had existed, a great deal of long-winded and obscure explanation might have been avoided." [1]

Many people find discussion about nomenclature irrelevant to their needs; others believe that it is essential to know what we mean by the terms we use before anything can be discussed with precision. We tend to belong to the second category, though we have to admit that we have managed to talk about handwriting for a good many years without arriving at a clear set of terms, even for ourselves. The reasons for addressing the question of handwriting nomenclature now are twofold: first, many teachers have told us that they do not know what they should call the parts of the letters they need to describe; secondly, we have become aware that confusion arises because those who write about the teaching of handwriting use terms in different ways.

In this paper we merely draw attention to the need to sort out terminological confusions and provide tentative suggestions for handwriting nomenclature. It is not our intention to discuss subtle distinctions in handwriting that distinguish one style of handwriting from another or to discuss approaches to nomenclature in other fields of study that have to do with letterforms. We shall refer to some of the latter in passing, but our overriding concern is to provide those involved with the teaching of writing, or research into it, with an initial framework of terms that might be useful to them. The proposals we make, though the subject of considerable thought and discussion, should be regarded as provisional and are likely to be revised in response to feedback; they are presented here in the hope that they will go some way toward reducing misunderstandings in the future and make the job of teaching handwriting a little easier.

Nomenclature for the teaching of handwriting has been complicated by two factors. First, most of the terms that have been coined for letterforms in general have come from other fields of study, principally from printing and paleography. Secondly, most of those concerned with the teaching of handwriting have had to keep in mind not only their own specialist needs, but

also the need to find words that make sense to the children they teach. For these reasons, the terms presently used to describe handwriting are varied and often confusing. In writing this paper, we decided to put emphasis on simplifying issues even though this may have been at the expense of differentiating nuances of form, such as the differences between the lower parts of the written forms of "t" and "i."

The need for work of this kind to be undertaken has been evident for many years. From the late 1960s until 1980, a surviving study group of the short-lived Working Party on Typographic Teaching met occasionally at the Department of Typography & Graphic Communication at Reading University to discuss matters to do with the teaching of writing. This interest in handwriting stemmed from a belief that many issues relating to graphic language cross technological boundaries and that typography should not be divorced from handwriting. The Working Party on Typographic Teaching as a whole was concerned with the teaching of those who might become professional typographers: the sub-group referred to above had the teaching of handwriting as its specific focus, though it attempted to involve a broad range of specialists in order to provide a bridge between the educational world and practitioners. The last two meetings of the study group of the Working Party on Typographic Teaching took place in 1979 and 1980 and were specifically devoted to questions of terminology for letterforms. The group had in view the need for a nomenclature that would find favor with specialists representing different areas of interest in letterforms, such as paleographers, epigraphers, printers, typographers, calligraphers, teachers of writing and computer scientists. Though friendly, the discussions were lively and, on occasion, heated. Understandably, very few clear recommendations emerged; those that did are referred to in the tables below.[2]

The teaching of handwriting excites more interest now than it did ten or twenty years ago, and it is probably true to say that the issues discussed by the study group are more acute now than they were then. Issues of nomenclature have become more press-

ing in recent years, partly because specialists in other disciplines have begun to apply their own particular skills and methodologies to the teaching of writing and partly because recent changes in the production of "machine writing" have brought hitherto specialist terms, such as leading and serif, into everyday language, including that of teachers.

A common nomenclature for handwriting is certainly desirable so that we know what we and other people mean by such terms as bowl, stem, stroke, ascender and tail; so too is consistent use of these terms. Some problems have simply to do with naming; these are the easiest to resolve. For example, the collective set of letters "ABCDE," etc., is relatively easily recognized as being different from "abcde," etc.: it is simply a matter of whether we call the first set capitals, capital letters, uppercase, majuscules, big letters or block letters, and the second set lowercase, minuscules or small letters. Other problems are more difficult because they have their roots in differences of interpretation, such as whether a change of stroke direction is abrupt enough to be considered a "broken stroke," or is sufficiently homogeneous to remain a single stroke (defined by one leading paleographer as a single trace of the pen).[3] We have avoided most such problems in this paper.

There is also the question of the kind of nomenclature to use. Gaskell provides a very useful description of the three principal categories of terms, which he describes as calligraphic, anthropomorphic and geometric.[4] Traditionally, many of the terms we use are metaphoric and frequently anthropomorphic (stem, arm, leg, tail). Other terms in common use have to do with the means of production (stroke, thick, loop), or with the relationship of the finished trace to some geometrical idea (upright, horizontal, diagonal). Examples from each of these categories are so embedded in the language we use to describe letters that it would be pointless to try to use terms from any one of these categories exclusively. It seems likely, however, that professionals will find calligraphic and geometric terms more useful than anthropomorphic ones, and that those concerned with teaching children

to write will turn naturally to the use of metaphors with human or animal bodies (indeed, it is possible that this explains the very long tradition in the use of such terms). The terms we propose have been chosen with the needs of teachers in mind, but we accept that different terms will probably need to be used when talking to young children and that good teachers should use whatever terms prove to be most effective in a given situation.

The most coherent and fully developed approaches to nomenclature for letterforms have been devised with printing in mind. However, long before this, as Gaskell has pointed out, the authors of the earliest writing manuals found it necessary to refer to individual parts of letters and "found or invented terms in French, German, Italian and Latin for stroke, serif, thick, thin, and so on,"[5] and at least one sixteenth-century writing master, Gerardus Mercator, attempted to define some of the terms he used.[6] The first published nomenclature relating to printed letters appeared in Moxon's *Mechanick Exercises* of 1683. This set the pattern for what needed to be described for printed letters, but in the twentieth century, much more comprehensive attempts have been made to provide a coherent nomenclature for the parts and features of printed letters. The most significant of these have been Joseph Thorp's two contributions in the *Monotype Recorder* in the early 1930s: "Towards a Nomenclature for Letter Forms," and "Experimental Application of a Nomenclature for Letterforms of Roman Type,"[7] and Philip Gaskell's "A Nonmenclature for the Letterforms of Roman Type," in this journal.[8] There is also a British Standard, "Specification for Typeface Nomenclature,"[9] which built on common practice. However, these publications deal only with the parts of letters and certain other features of them, and they deal only with roman types (that is, not gothic or non-latin ones). But above all, they deal only with types.

Problems of nomenclature for writing, and particularly for the teaching of writing, are very different, largely because there is the extra issue of process (how the marks are made). A nomen-

clature for writing needs to embrace all, or at least most, of the visible features of letterforms; but ideally, it also has to take into account the means of achieving them through sequences of marks and the real or notional guidelines associated with letterforms, such as horizontal lines. In addition, any complete nomenclature for writing has to address the question of joined letters and degrees of cursiveness. Nomenclature for writing is therefore a minefield, and few attempts have been made to come up with a set of proposals. This paper should be seen as no more than a means of opening up the subject for wider discussion. We do not pretend that it is exhaustive in scope or that it should be regarded as definitive. Apart from anything else, neither of us is concerned with the teaching of writing on a day-to-day basis, which must mean that we are unaware of some of the problems faced by teachers.

The information set out below in the form of tables draws primarily on the main published sources known to us. To our knowledge, nothing has been published in relation to either paleography or the teaching of writing that can compare in thoroughness with the publications on nomenclature for typefaces referred to above. Paleographers may have felt that the differences in written letterforms across cultures and periods have been so great, and the variations in the forms of letters and styles of writing so continuous, as to defy any all-embracing nomenclature; teachers of writing have, by tradition, been more concerned with practicalities than with what might seem to be theorizing for its own sake. Nevertheless, we have scoured publications on paleography, printing and writing to discover what terms have been used to describe parts of letterforms and features of writing. We have found particularly useful short notes of paleographical terms in Malcolm Parkes's *English Cursive Book Hands* (Oxford: Clarendon Press, 1969) and Anthony Petti's *English Literary Hands from Chaucer to Dryden* (London: Edward Arnold, 1977) and have made good use in a general way of the writings of Harry Carter, Alfred Fairbank, Christopher Jarman, Tom Gourdie, Nicolete Gray, Edward Johnston, James Mosley, Gerrit Noordzij, A. S. Osley, Marion Richardson, Rosemary Sassoon and Peter Smith.

In addition, a small survey was undertaken with some British schoolteachers in order to establish what terms they use to describe the parts and other features of letters. The sample was not controlled. About fifty questionnaires were distributed on a personal basis to teacher friends and teacher colleagues of friends. The questionnaires consisted of sheets showing groups of letters, parts of letters, guidelines for producing letters, and variant forms of letters. The teachers were asked to record in writing what they called the things they were shown. Only eighteen questionnaires were completed, and feedback suggests that many teachers were reluctant to participate because they had no terms to describe what they were shown. The teachers were asked to record what terms they used when discussing handwriting with their colleagues, though some responded by giving, in addition, the terms they used when talking to children. The latter, which included such terms as cat letters and giraffe letters, have not been included in the published tables.

This small survey was undertaken merely to provide some evidence for the kinds of terms being used by teachers. It does not follow, of course, that the terms most widely used are the best ones, but our preliminary findings proved sufficiently revealing that we thought it would be worthwhile to undertake a better controlled and larger-scale project of a similar kind. Our initial findings indicate that some teachers make a distinction between the terms they use when talking to, or writing for, one another and those they use when talking to young children; in the second survey, we hope to raise this as a specific issue. The survey also revealed that teachers found naming things very difficult: a frequent response on the questionnaires was, "I don't have terms for this/these"; and some teachers indicated that they preferred to show children how to make a particular letter rather than use terms to describe it or its components.

Ideally, this paper should have included a discussion of nomenclature in relation to the writing of other scripts taught in Western schools (such as Arabic, Bengali, Gujarati). We believe that some of the terms proposed are applicable to such scripts, and there are obvious advantages in using terms that can have wide applicability. It would also have been desirable to include a con-

cordance of the terms used in the major European languages to describe the same things. Since the forms of handwriting used in most parts of the world that use the Latin alphabet seem to be losing their national characteristics, it would probably be relatively easy to produce such a concordance in the second stage of this exercise. We shall wait to see what kind of interest this proposed nomenclature generates.

A NOTE ON THE TABLES

The first column of each table lists all the terms shown in the other columns; within this list, we have indicated in bold type the terms we think are most appropriate for teachers to use when discussing handwriting with their colleagues. (Good teachers will use whatever terminology is appropriate when talking with children.) An asterisk after a term in the first column indicates the one preferred by the study group of the Working Party on Typographic Teaching in 1979 and 1980.

It was originally intended to give exact sources for all the terms shown; on reflection, it was decided that this would complicate the tables unnecessarily. The authors whose works have been consulted are given on page 193.

TABLE 1 **CATEGORIES OF LETTERS**

This table shows particular groups of letters that are likely to be referred to in the teaching of handwriting.

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
ABCDEFG	big letters block capitals **capital letters*** capitals caps majuscules uppercase	big letters block capitals capital letters	capital letters capitals	capitals majuscules	capitals caps majuscules uppercase
abcdefg	little letters lowercase lowercase letters minuscule alphabet minuscules ordinary letters **small letters***	little letters ordinary letters small letters	lowercase letters minuscule alphabet small letters	minuscules small letters	lowercase minuscules
fgjpqy	descenders **descending letters*** hanging down letters infralinear letters letters that hang under the line letters with descenders letters with descending strokes letters with tails letters with tails hanging below the line small letters which go below the line	hanging down letters letters that hang under the line letters with tails letters with tails hanging below the line small letters which go below the line	descenders letters with descenders	descenders infralinear letters letters with descending strokes	descenders descending letters

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
bdfhklt	ascenders **ascending letters*** letters with ascenders letters with ascending strokes letters with sticks small letters which are tall supralinear letters tall letters tall"ordinary" letters	letters with sticks small letters which are tall tall letters tall "ordinary" letters	ascenders letters with ascenders tall letters	ascenders letters with ascending strokes supralinear letters	ascenders ascending letters
12345	digits figures numbers **numerals**	digits numbers numerals	numerals		figures numbers numerals
and	letters without hooks non-cursive printing **print script** static print	letters without hooks printing	print script static script		
and	flowing separate letters letters ready for joining up **letters with exit strokes** letters with flicks letters with hooks letters with kicks letters with links	letters ready for joining up letters with flicks letters with hooks letters with kicks letters with links	flowing separate letters		
and	cursive joined up letters **joined writing** joining up script	joined up letters joined writing joining up cursive	cursive joined writing	cursive running	script

TABLE 2 **DESCRIPTION OF ORIENTATION**

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
	perpendicular	straight down	vertical stroke	perpendicular	
	straight down	upright (line)		vertical	
	upright*				
	vertical				
	vertical stroke				
/ \	**diagonal**	diagonal (line)	diagonal stroke	oblique	
	diagonal stroke	oblique			
	oblique*	slope			
	slope				
—	across	across	horizontal stroke	horizontal	
	cross stroke	cross stroke			
	horizontal*	horizontal (line)			

TABLE 3 **PARTS OF LETTERS**

The parts of letters to be named in this table are shown by a solid line.

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
f g j t y	flick	flick	tail	tail	tail
	hook	hook			terminal
	tail	tail			
	terminal				
b d g h k q y	back(s)	down part(s)	back stroke(s)	back(s)	main stroke(s)
B D E F K M	back stroke(s)	down stroke(s)	stem(s)	main stroke(s)	stem(s)
N P R U	down part(s)	long bit(s)		stem(s)	
	down stroke(s)	stick(s)			
	long bit(s)				
	main stroke(s)				
	stem(s)				
	stick(s)				

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
a b c d e g k o p q B D O P R Q	Many people fail to make the distinction between the written mark, the space enclosed by it, and the two combined. Three different terms are recommended to make distinctions. **bow*** (the written mark) **bowl*** (the written mark with the space enclosed by it) circle counter eye hole **inside shape** (the space enclosed by a bowl) internal space interior shape* lobe loop round	bowl circle hole round	bow	bowl eye lobe	bowl counter inside shape internal space loop
v w x y z A K M N R	**diagonal(s)** leg (in the case of R and K) oblique stroke(s)		diagonal(s)	oblique stroke(s)	diagonal(s) leg (in the case of R and K)
c e s C G S Q W X Y Z	**open curve(s) (upper/lower)** arm(s) upper/lower part(s)				arm(s) upper/lower part(s)
I J	**serif(s)**		serif(s)	serif(s)	serif(s)
J Q	**tail**			tail	tail

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
	The horizontals in these letters are of different kinds. The term "cross stroke" is reserved for t, f, A, H and T; it might also be applied to the horizontal stroke of a G.	cross cross stroke	cross bar	head stroke	cross stroke
	arm(s) bar(s) cross cross bar **cross stroke**		cross bar	cross bar cross stroke head stroke (if at top)	bar
	head stroke **horizontal(s)** limb(s)			bar(s) limb(s) arm(s)	arm(s)
	curly tail curved flick exit exit curve **exit stroke** flick foot hook kick link little curved upstroke little diagonal tail serif	curly tail flick hook kick link	curved flick exit exit curve exit stroke hook little curved upstroke serif	foot hook little diagonal tail	
	join joining **joining stroke** joining up links ligature link	join joining joining up links	join joining stroke ligature	link	

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
	flick pointed tail small flick at the end tail tick	flick pointed tail tail tick	small flick at the end tail		
	arch(es) bridge(s) limb(s)	arch(es) bridge(s)	arch(es) bridge(s)	limb(s)	
	arch inverted arch swing **upside down arch**		arch inverted arch swing		

TABLE 4 **LINES AND HEIGHTS**

The lines (notional or real) referred to in this table are represented by a solid line. The heights are represented by arrows.

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
	base line* foot line line of writing the line writing line	the line	base line	line of writing writing line	base line foot line
	capital-letter line* capital line cap line just under twice the x length		just under twice the x length		capital line cap line

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
	head line			upper line	head line
	mean line			minim line	mean line
	minim line				x line
	small-letter line				
	upper line				
	x line*				
	bottom line				bottom line
	descender line*				descender line
	**ascender line***				top line
	top line				
	capital height	space for capitals			capital height
	cap height				cap height
	capital-letter height				
	space for capitals				
	height of the small letters	space for small letters	height of the small letters	minim height	x height
	minim height		x height		
	small-letter height				
	space for ordinary letters				
	space for small letters				
	x height*				

TABLE 5 **SOME VARIANT FORMS**

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
	**single-bowled 'g'**				
	**double-bowled 'g'**			double-lobed	double-looped
	double-lobed 'g'			twin-bowled	
	double-looped 'g'			two-compartment	
	twin-bowled 'g'				
	two-compartment 'g'				

	synopsis of terms and recommendations	teachers	handwriting manuals	paleography & lettering	printing & computing
a	single-story 'a'				single-story
a	double-story 'a'				double-story
	two-story 'a'				two-story
12345	lining figures				lining figures
	lining numerals				modern figures
	modern figures				ranging figures
	ranging figures				
123456	non-lining figures				non-lining figures
	non-lining numerals				non-ranging figures
	non-ranging figures				old style figures
	old style figures				
k	straight 'k'				
k	looped 'k'				
	kicking 'k'	kicking 'k'			looped 'k'
z	'z' without tail				
3	'z' with tail				
f	'f' without tail				
f	'f' with tail				
y	angled 'y'				
y	arched 'y'				
u	'u' with stem				
u	'u' without stem				
R	'R' with a diagonal leg				
R	'R' with a curved leg				
Q	'Q' with a diagonal tail				
Q	'Q' with a horizontal tail				
Q	'Q' with a curved tail				

ENDNOTES

[1] Osley, A. S. 1980. *Scribes and Sources: Handbook of the Chancery Hand in the Sixteenth Century.* London: Faber & Faber.

[2] We should like to thank all those who contributed to these discussions and to acknowledge ideas which may have been expressed by individuals and taken up here without our realizing it. Among those attending these meetings were: Stuart Barrie, the late Hella Basu, Ralph Beyer, Nicholas Biddulph, Jennifer Booth, Gunnlauger Briem, Kenneth Brooks, John Burgess, Peter Burnhill, Ann Camp, Madeleine Dinkel, Sheila Donovan, Miriam Goluchoy, David Graham, Nicolete Gray, Sid Harley, Michael Harvey, the late Herman Hecht, the late Ernest Hoch, Robin Kinross, Alan May, James Mosley, Terry O'Donnell, Bridie Raban, Gillian Riley, Pat Russell, John Salsbury, Rosemary Sassoon, Roger Smith, Richard Southall, Paul Stiff, Miriam Stribley, Bernard Thurlow, Michael Twyman, Susan Walker, George Webb, Frances Woolcombe, Brain Yates.

[3] Parkes, M. B. 1969. *English Cursive Book Hands.* Oxford: Clarendon Press, xxvi.

4 Gaskell, P. 1976. "A Nomenclature for the Letterforms of Roman Type." *Visible Language* 10, no. 1: 41-51.

[5] Gaskell. "Nomenclature," 41.

[6] See Osley, A. S. 1980. *Scribes and Sources.* London: Faber & Faber,189.

[7] *Monotype Recorder.* 1931. Vol. 30, no. 240:9-19; and 1933, New Series no. 1:15-19.

[8] Gaskell. "Nomenclature," 41-51.

[9] BS 2961, 1958, revised 1967.

BIOGRAPHY

Michael Patkin is a surgeon in South Australia, past president of the Ergonomics Society of Australia and executive board member of the Communication Research Institute of Australia. He has an engergetic interest in hand function and was substantially involved in the Australian pandemic of "Repetition Strain Injury."

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Figure 1

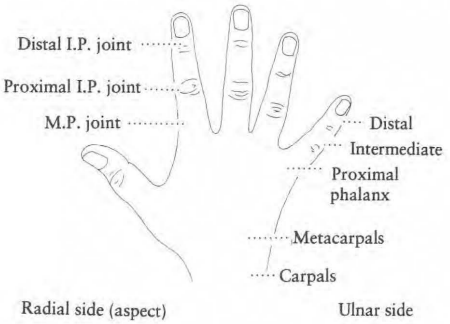
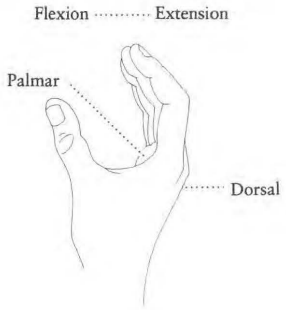


Figure 2

ANATOMY OF THE HAND

ABSTRACT **Precise reference to the elments of the hand and its movement is important to medical science. This brief, diagrammatic article orients the layperson to the most common terms.**

Figure 3



Each hand is a complicated organ of touch and movement. The two hands together with the brain form a powerful and subtle system of manipulation, sensation and communication.

There are fifteen bones within the hand, eight within the wrist and two in the forearm. Within the hand itself there are eighteen small muscles and more than a dozen muscles in the forearm that act on the hand through tendons. Various joints, ligaments, other structures and their interactions, as well as interactions with other parts of the body, ensure the complex activity of the hands. Complete description and analysis is beyond the scope of this paper, nevertheless, there is value in considering them at a simple level.

Standard names for the digits are used by physicians because otherwise mistakes can occur such as operating on the wrong finger. They are: thumb, index, middle finger, ring finger and little finger (figure 1).

The bones and joints of the hand have standard names in anatomy (figure 2). A phalanx (plural is phalanges) is one of the three bones in a finger or two in the thumb. The "distal" phalanx is the one at the tip, the next is the "intermediate" phalanx (except for the thumb), and the nearest is "proximal." The five bones in the palm of the hand are known as the metacarpals. These are numbered from first to fifth, starting from the thumb side of the hand. The carpals, or carpal bones, are the eight small bones of the wrist.

Each finger has a proximal and distal interphalangeal joint (IP), while the thumb has only an IP joint. The metacarpophalangeal (MP) joint is the most prominent knuckle, or bone-end, in each finger-joint.

Special adjectives describe the aspects of the fingers, hand and forearm. The two bones of the forearm are the radius (which looks like the spoke of a wheel) on the thumb side, and ulna, explaining the adjectives "radial" and "ulnar." "Palmar" (sometimes "volar") and "dorsal" refer, respectively, to the palm and back of the hand and fingers (figure 3). "Thenar" and

"hypothenar" refer to the thumb and little finger, for example, "thenar eminence" is the ball of the thumb and "hypothenar eminence" is the raised area on the ulnar side of the palm.

Movements also have special names. In the case of the fingers, flexion is closing the joints into the palm of the hand and extension is the opposite movement. Abduction of a finger is moving it away from the midline of the hand and adduction is the opposite movement. For the thumb, these four movements take place at a right angle to those of the fingers. Movements of the hand consist of pronation or having the palm downwards (this can be remembered as "prrr" for the stroking of a cat) and supination or having the palm upwards (the way you would hold it to make a cup for holding something). Mid-pronation is half way between, with the thumb side of the hand uppermost. There are other names for more specialized movements and postures such as protraction, retraction and circumduction.

Hand grips and postures also have special names, such as power grip, pinch grip and precision grip. There are many other variations which are not standard.

More detailed information can be found in standard textbooks on anatomy or the surgery of the hand.

REFERENCE

Wood, Jones F. 1949. *Principles of Anatomy as Seen in the Hand.* London: Balliere Tindall and Cox.

BIOGRAPHY For the last twelve years, **Rosemary Sassoon** has been researching the educational and medical aspects of handwriting. This has included work at the Medical Research Council Applied Psychology Unit at Cambridge, and at several major hospitals, as well as international advisory work with education departments in Australia, Scandinavia and Malaysia. Her books on handwriting include: *The Practical Guide to Children's Handwriting, Handwriting: a New Perspective* and *Handwriting: the Way to Teach it*. She is currently working on a series of typefaces entitled "Sassoon Primary," which are meant to bridge the gap between reading and writing. The original design concentrated on details that make the acquisition of the skill of reading easier for children with learning difficulties.

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Figure 1

Figure 2

WRITER'S CRAMP

ABSTRACT

An interim report on work with writer's cramp patients suggests that a wider view of this condition is needed. The article proposes that there are aspects inherent in the act of writing, as well as in taught strategies, that might influence the attitudes to, and treatment of, this particular movement disorder. Simple practical measures aimed at alleviating the symptoms are described. They benefit patients and, at the same time, provide some possible answers to issues that have baffled those who have previously looked at writer's cramp from a medical perspective alone.

Figure 1 The artist Delacroix portrayed holding his quill between his index and middle finger. From a French bank note.

Figure 2 An alternative penhold illustrated by the Belgian neurologist Dr. H. Callewaert. From *L'Ecriture Rationelle* (Lebegue 1942)

Figure 3 The alternative penhold is comfortable when using modern pens, allowing them to be held almost upright.

Figure 3

Writer's cramp is a controversial area pertaining to handwriting; there is little agreement on the part of the experts. Additionally, there is often little help for the sufferers of this particular condition. This article does not set out to challenge medical views on what is a baffling and increasingly common complaint, but makes a plea for cooperation among the different disciplines involved, in the interests of both patients and research.

This is not the right occasion to present case studies but to give an overview in the form of a distillation from observations of perhaps fifty recent cases of writer's cramp. Individual patients have shown obvious differences in details, but a general pattern of symptoms and attitudes has emerged, along with a pattern of reponses to similar suggestions for rehabilitation. A research project is planned to test the long-term implications of this work—not only for the patients but for the attitudes generally held towards the condition of writer's cramp itself. Longitudinal studies are necessary to validate any therapeutic technique, but inevitably they take both considerable time and money. This contribution is offered as an interim document in the hope that it will stimulate discussion and experimentation. It may also give hope to writer's cramp sufferers and should alert any readers to reconsider their writing strategies if they find it painful to wield a pen.

RESEARCH REVIEW

Writer's cramp is by no means a modern complaint. Solly (1864) reported on "scrivener's palsy or writer's paralysis." He stated, "Upon your early correct diagnosis may depend the health and happiness of your patient. If you mistake its real nature and regard it as incipient softening of the brain, you may destroy the happiness of your patient and bring on the very disease that you have erroneously diagnosed." Solly described "how the muscles cease to obey the mandate of the will" and linked scrivener's cramp to the several other occupations where sets of muscles are paralyzed by long-continued exertion: shoemaker's cramp, milking cramp, musician's cramp, compositor's and the sempstresses' cramp. It is interesting to note that he says of writer's cramp

that "this form of palsy is rare notwithstanding that the greatest part of the middle classes of London get their bread by the use of the pen." Modern technology may have solved the problems of shoemakers, milkmaids, compositors and sempstresses, but musicians still suffer from cramps, and their symptoms are often compared with those of writers.

Sheehy and Marsden (1982) provide an historical review of the literature on writer's cramp, noting that quite recently it was still being described as a "primarily psychogenic." They refer to writer's cramp as a focal dystonia and divide it into two categories:

1 Simple writer's cramp—where the patient only exhibits difficulty when writing, other manual acts being carried out normally.

2 Dystonic writer's cramp—where muscle spasms affect not only writing but other manual tasks, such as the ability to handle a knife and fork, cup and saucer, etc.

Hughes and McLellan (1985) put forward an interesting point, saying "We suggest that writing is prone to induce dystonia because of concurrent requirements. The first is to hold the pen securely in the fingers and to keep it applied evenly to the paper. The second is to permit rapid and very fine modulation of activity in all the co-activating muscles." Muscles that oppose one another (flexors and extensors) must be tensed within a conventional tripod grip, and at the same time, delicately controlled to form the letters. This "conflict" would be exacerbated by the environment in which many people have to write today, at speed and often under considerable tension in competitive situations.

The Belgian neurologist Callewaert (1962, 1962, 1963) held interesting views on the effects of penhold and training on writer's cramp or "hyperkinesia," as he reported it to have been termed by Jacoub in the last century. Callewaert (1963) suggested that "indeed such patients have been writing since primary school with exaggerated effort." He continued, "It is thus possible to illustrate writer's cramp with a picture of an unskillful child in the handwriting act." He considered that "skilled writers as well as those whose writing habits have been altered through

education, exhibit complete relaxation of those muscles not directly involved in the act of writing."

In addition to recommendations concerning penhold, Callewaert held strong and somewhat controversial views on letterforms. He considered the extension movements that lead to slanting letters to be difficult. He stated his own point of view that "handwriting has now evolved to the extent that each letter is formed with an unbroken curved line avoiding interruptions and angles." While accepting the possibilities of such letters as a therapeutic measure, it may have been this involvement in letterforms that did not conform to the models used in many other countries at that time that prevented Callewaert's work from reaching a wider audience. His 1962 paper was delivered at an international conference on handwriting at the University of Wisconsin. Despite his emphasis on the teaching of handwriting to children, this comment can be found in the discussion following his presentation: "The author has not presented experimental evidence in support of the round method, and his efforts appear to be primarily clinical. We have to assume that Dr. Callewaert's research has been directed toward the age-old student's disease, writer's cramp. The round method then is a system initiated as a therapeutic measure to minimize the tension and discomfort of writing through the relaxation of useless muscles."

Callewaert's own defense of the round-hand method of writing, with the pen held between the index and middle finger, appeared in an English summary at the end of an article written in French. "In this technique our two most agile fingers bend their phalanges simultaneously (in order to obtain loops and curves); the combined and harmonious action of the index and middle finger reduces to the minimum the opposition of the thumb which frequently obstructs the writer's movements when the instrument is held in the usual manner. This is in accordance with the view of Hughes and McLellan in obviating the adverse effects of the pad-to-pad opposition of the traditional tripod grip.

Callewaert's work has been helpful to my own clinical observations and the development of therapeutic techniques. One

example of a penhold similar to that recommended by Callewaert was found during the detailed research into penholds leading to Sassoon, Wing and Nimmo-Smith (1986), where the particular advantage of such a grip when using modern pens was discussed. Other such "alternative" penholds were later found occurring spontaneously in schoolchildren and adults in several different countries, where individuals had found them to their benefit. With the assurance that Callewaert's work provided, that this was unlikely to be harmful to anyone, I was able to proceed with confidence in recommending the particular penhold that he suggested, and other similarly unconventional penholds, to patients.

A PERSONAL VIEW OF WRITER'S CRAMP

The first and perhaps main point raised here is whether writer's cramp should be looked at entirely as a medical condition. Neurologists, psychiatrists or surgeons (depending on the referral) will see their patients already in a serious condition, and must prescribe accordingly. There are aspects of this condition, however, that may be influenced by the specific implications of handwriting itself, as different from the purely mechanical repetitive movement of the muscles. The basic need of humans to express themselves in a graphic way is discussed on page 166. The intellectual involvement in the content of writing and the emotional environment in which the act takes place may all play a part. Above all, the effect of the visible trace itself on the writer—the failure involved in either the total inability to produce a personal mark, or the disintegration of a once adequate writing—needs considering. These aspects could be implicit in the act, stemming initially from handwriting rather than from the nervous system.

By treating patients with the same techniques used for more general handwriting problems, it is often possible to alleviate the symptoms of patients who have been diagnosed as having writer's cramp. While it is not yet possible to say whether such patients are "cured," at least they have had their ability to write restored. In addition, this may be one way that clues to the nature of this complaint may be disclosed.

We can start by considering some possible commonsense, rather than medical, causes of writer's cramp, in particular why this complaint should be on the increase. Modern technology should be alleviating the situation by taking many of the more extensive tasks onto keyboards. We need to explore all aspects of this complex subject. Some clues to explain some symptoms can be found within the historical repertoire of letterforms and penholds; others can be found by examining changing educational methods or while examining the effects of modern writing implements.

PAIN

Many writer's cramp patients suggest that the origins of their trouble date back to stressful periods when handwriting became painful for them. The pain appeared to arise from a variety of causes and occasionally began quite early in their school days. This study of adult writer's cramp sufferers must be seen as an extension of many years working with children with handwriting problems. Many of them suffer considerable pain when writing. A small but worrying survey reported in Sassoon (1990) found 40 percent of girls and 25 percent of boys of school-leaving age could be counted as suffering pain when writing. This was quantified after they had responded to a six-point diagnostic list that involved the seat of pain, which specific tasks caused most pain, duration of pain, etc. Less formal surveys with higher achieving pupils of the same age, pointed to an even higher proportion of pain. Tension tremors can occasionally be observed in children under stress. Such tremors improve or worsen depending on the children's home or school environment.

Occasionally, the pain and tension can be so intense that pupils become unable to use their writing hand. This is often related to overuse at examination time, but cases of younger children appear to be on the increase worldwide, especially in countries where the education system is highly competitive. Can this, then, be termed juvenile writer's cramp?

HANDWRITING WITHIN THE EDUCATIONAL SYSTEM

This must bring into question the way that our children are taught to write and the usage of writing within primary, secondary and tertiary education. My own feelings are that writing problems are induced by our educational system, and the ignorance concerning the needs of writers is worsening in many countries as a generation that has not had adequate instruction becomes the teachers of the next, unfortunate generation. In particular:

1 Schools all over the world consider the written trace but seldom the writers—in particular, not their hands or body posture.

2 There is an idea that there is a conventional, and therefore unalterable, right or wrong way of doing things, instead of an understanding that both writing implements and the usage of handwriting have changed dramatically in the last few decades. This might mean that different attitudes to writing strategies are needed.

3 The almost universal insistence on neatness leads to an unbalanced view of the purpose of writing, which can have disastrous results for those who cannot relax this perfectionist standard when educational or other real-life situations demand speed. A more flexible attitude is needed from the start, recognizing different levels of writing appropriate for different tasks.

OTHER CONTRIBUTORY CAUSES OF WRITER'S CRAMP

The factors listed here as possible contributing causes of writer's cramp can be viewed separately or as an inexorable progression.

1 Unsuitable writing strategies: posture, paper position and above all, penhold that rapidly become habitual. Writers themselves do not seem to realize that quite simple factors are affecting their comfort. They continue to twist their bodies to adapt to some unsuitable paper position instead of just moving the paper. They strain their hands without realizing how they are

harming themselves when simple experimentation with new, and not necessarily conventional, penholds might provide a solution.

2 Tension and pain when the hand is repetitively misused and perhaps overused. The written trace deteriorates as a direct result of a tense hand, leading to either outside criticism or self-criticism. Then either fear of more criticism or disgust at hand-writing which may be perceived as ugly can lead to more tension and further pain.

3 Pain worsening at any time of extra tension in education, note taking, exams or later career as the demand for extra speed exacerbates the situation. As writing begins to fail, the writers ignore the warning of pain in their attempt to succeed in whatever written task is required of them. The situation is aggravated by those with too high an expectation of the level required for any particular task: the perfectionists, the over-conventional or the socially insecure.

4 The pain and tension develop into involuntary movement or total inability to move the writing hand. This may develop through various stages of jerkiness. This can be observed in young people who appear to be on the way to writer's cramp. Tension may initially be noticed as excess pressure of the fingers on the pen or the pen on the paper, but it is the downward pressure of the whole hand on the desk that is more harmful. The pen then cannot move along the line, and the letters, such as they are, may be superimposed on each other. The elbow gets raised to release the pressure; replacing it produces a jerky movement. Keeping this movement up puts the strain on the upper arm, and that soon turns to more pain. Many cramp patients demonstrate their inability to write while resting their hand on the table, an echo of the time when it hurt to do so. The awkward and painful "elbow raised" position is an unsuitable defensive strategy that has become automated.

This detailed explanation may help to an understanding of why some patients find that they can use a pen when the hand is completely unsupported on the writing surface, but then find it

difficult to control either size or quality of writing. It also might explain why writer's cramp was less common a hundred years ago when people were carefully trained not to support the writing hand on the desk.

5 Physiological reasons can also contribute to this decline. Some patients have illustrated that atypical body proportions can mean that they were never able to be comfortable with standard furniture. In these circumstances, the resulting poor posture may well lead to pain when writing and contribute to the final condition. I have found, for example, some support for the idea that there is a correlation between long fingers and pain. It is not easy to displace overlong fingers on a pen—however fat the barrel.

As for the behavioral aspect, undoubtedly the writer's character plays a part. The more perfectionist writers may be in their nature, the more any deterioration in the standard of writing may worry them. This, in turn, starts the spiral of tension and pain which results in the writer focusing attention on the act of writing. Once the act of writing is no longer automated, it becomes slower and more stressful. More relaxed writers may take such matters in a more lighthearted and balanced way. Over-obedient people, who betray their character by still clinging closely to the model that they were taught in primary school, may be more prone to problems. This is because they are less likely to develop the personal shortcuts that enable them to speed up their handwriting. They may look upon such alterations, that are signs of maturity, as a deterioration in a self-imposed standard. Inventive people, purposely or subconsciously, may have already experimented to find quick personal so1utions to simplifying letters and joins in order to create an efficient personal writing. These writers will be better equipped to deal with the increased demand for speed at key moments in their careers.

COMMONSENSE EXPLANATIONS

It is possible to provide quite commonsense explanations for some of the aspects of writer's cramp that baffle the specialists

who consider writer's cramp from an exclusively medical perspective. Statistically, it may be difficult to prove any of these points, even with the longitudinal study that is in preparation at present. Take just one point: the well-documented sequence of events that happens if the patient tries to overcome the cramp by changing the writing hand. The condition usually occurs in the second hand within five years.

This seems reasonable, looked at in a different way: if the patient changes writing hands without altering the attitudes that led to tension in the first place, then the cycle is likely to repeat itself. Patients who have been through such experiences tell me that when things start to go wrong with the second hand, the tension soon mounts. There is a rapid decline because of the worry that there is now no alternative, and they may soon have no means of writing.

There is an additional problem. When the natural hand is no longer capable of writing, some patients report that they seem to lose confidence in it. They explain how frightening it is when some part of their body ceases to obey their commands. The condition then seems to escalate; when the patients stop using their natural writing hand, it may eventually become unable to perform other movements, such as picking up a glass. Writing is more than a means of communication—it is oneself on paper. If you are successful, your writing reassures you; if it fails you, the constant visual reminder of your failure is there to torment you. Is this a possible explanation of how Sheehy and Marsden's dystonic stage of writer's cramp can commence?

INTERFERING WITH AUTOMATIC MOVEMENTS

At some stage, this seemingly inexorable progress towards the serious condition of dystonia becomes a problem of the nervous system. Again, this may be able to be explained in fairly simple terms. When writers start to worry about their written trace, they focus their attention onto a movement that should be so well trained that it has long become internalized and automatic. This then interrupts the mechanism by which an automated action takes place and replaces it with a conscious effort. Once

this happens, the tension involved in consciously producing and perfecting each stroke of written letters seems to make it increasingly difficult for the writer's hand to respond. This escalates as the writer strains even more to make his body react, reflecting this in an ever-declining trace. Exactly the opposite is needed—the writer needs to forget all about the act of writing and let the motor memory deal with it.

There are plenty of precedents for this in everyday situations without referring to scientific papers. You can try out this idea of interrupting an automatic action with some complex trained movement that you are familiar with. What happens when you are driving your car and start wondering what your feet are doing on the pedals? What happens to your golf swing, tennis stroke or intricate dance routine when you start worrying ahout one small point in the chain of automatically trained movements of the muscles that are involved? It usually disrupts the efficiency of whatever you have previously automated through lengthy motor training. Should you continue to be conscious of the details of what you are trying to perform, then tension will exacerbate the situation.

DEALING WITH THE SYMPTOMS OF WRITER'S CRAMP

This involves three distinct phases:

1 New strategies for writing posture to fit in with individual needs—and a new penhold.

2 A new and realistic attitude to the concept of handwriting.

3 Help with the actual letterforms to show how personal shortcuts can save time, speed up writing and suit each writer's hand. It is also necessary to give writers a pride in their own trace and individuality.

The first point, about the importance of posture, table height, slanting writing surface, etc., is generally quite easy to explain and justify. All of this is detailed in Sassoon (1990) and other publications. Of all the aspects of posture, penhold is the most complex. Learning to assess the separate elements of hand and finger position as detailed in Sassoon, Wing and Nimmo-Smith (1986) is one matter. Deciding which alterations are likely to

succeed with individuals is another. An initial success is of great importance when dealing with something that is so involved with a patient's self-confidence.

The other two parts of the treatment are unfamiliar to therapists of all medical disciplines. They are outside of their training, and often even of their comprehension. This could be the reason why attempts at biofeedback, psychotherapy, hypnotism, etc., seldom succeed. Such treatments may help the patient in the important aspect of relaxing, but they do not deal in any depth in an informed way with the act of writing. Patients are not given the detailed practical help that equips them with less painful strategies for writing. This practical help is vital. With it comes self-confidence and motivation from the realization that once again the production of a written trace is possible.

My technique is to question carefully against a background of knowledge gained from dealing with many cases of young people with problems, as well as with adult patients. It is important to discover the earliest possible cause of each patient's problem and to discuss how and when it started. If there is to be a hope that they can overcome the problem, patients must understand how the situation might have arisen. It is sometimes difficult to restore confidence in cases where patients have understood, or have actually been told by specialists, that their condition is incurable. I must assume that these techniques can alleviate the condition, or that in some cases it is reversable, and be able to pass on this confidence to my patients; otherwise, it would be pointless to continue with my work.

TECHNIQUES FOR REHABILITATION

Once the basic writing posture, table height and slant, paper position, etc., have been dealt with, the next step is to get patients to make some kind of mark with the hand that they are so sure they can never use again. There are many simple, and almost devious, ways of getting round this fear. If I am to be didactic, here is the place to be so. Never use the tripod grip at this stage, nor a conventional pen or pencil if you can avoid it. As far as the penhold is concerned, you should have no precon-

ceived ideas about which unconventional penhold will first succeed. Remember that those without the usual complement of fingers manage to write well with most unconventional holds, and that the patient's conventional attitude to the act of writing is one of the concepts to be dealt with before he can understand and overcome this disability. A force grip is a good starter, but an unconventional writing implement will in itself usually bring a different hold. A spoon or stick to motion the letter in midair, a brush and paint, then a fat graphite block or charcoal is a suggested progression. When it comes to a more conventional implement, there should be a wide selection of modern pens for the patient to choose from. Patients are surprised to find how much an entirely different size or shape of pen-handle, or point, can alter the way their hand and their writing works.

Other quite simple techniques for the first session include motioning, then writing, with the eyes closed or with both hands simultaneously. These methods seem to work because the patient is no longer focusing on either the written trace or the problem hand, but depending on the internalized movement of the letter previously stored in the motor memory.

Once patients have written their name or even their initials, this is a comforting achievement. There is now something to work on and improve, thereby harnessing motivation and the basic human need to make a personal mark. Progress can be rapid; one session is sometimes enough even when a patient has been unable to write for several years. This may sound strange for therapists whose training will have prepared them to consider in terms of a course of treatment. Once patients have been given new techniques and the confidence to go out and write again in a real-life situation, it is sometimes best to leave "the cure" in their hands. It is important not to impose any preconceived ideas. Patients must be encouraged to experiment when they are relaxed and in their own homes. You can always be at the end of a phone if further encouragement is needed. In this way, patients can take the credit for their own recovery, because after the first stages it is really just a matter of returning confidence

and the gradual relaxing of worry. Forgetting all about the way you write is what it is needed, so constant reminders of a disability, particularly in a hospital environment, can be counterproductive.

A video is useful, but not only for record keeping and future training sessions. Patients profit from seeing how quickly their movements have improved with new writing strategies. They are also helped by seeing how others in similar situations have progressed. Patients with dystonia seem to be isolated as well as frightened, and tend to think that they are unique. They are often ashamed of their involuntary movements, even when such movements may be almost undetectable to other people.

CONCLUSIONS

From the point of my own work, it is necessary to consider that:

1 Despite the fact that most of my patients have been referred by neurologists, I may have been dealing with patients where the original diagnoses might not have been quite accurate.

2 I have been finding that the very specific and localized complaint of writer's cramp is not always as serious or irreversable as has been previously thought—provided it is dealt with in an informed way.

3 Perhaps the symptoms have different causes or several triggers.

Whichever of these conclusions is most valid in any particular case, the argument must be that, for the sake of patients, the medical profession should begin to reconsider their approach to writer's cramp. Attitudes need to be altered about handwriting and with them the image of what is a taught, and not a natural, skill. There needs to be a widening of focus to reconsider the distinction between what is termed "normal" and what is "abnormal"—and whether in some cases it is not necessary to consider writer's cramp as a medical problem at all. Cases where unnecessarily narrow conventional attitudes have been contributory factors in the onset of the condition of writer's cramp illustrate this point. These conclusions are a plea for cooperation, and not for confrontation, with the medical profession.

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BIOGRAPHY

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GRAPHIC SKILLS AS A DIAGNOSTIC TOOL FOR WORKING WITH THE ELDERLY

ABSTRACT

Graphic skills may reveal a dementia process in progress. The observations are based upon about 1,500 aged subjects (>75), half of them with cognitive deficiency and the other without, residing in central Stockholm. The intention of this study was to develop a simple, non-verbal screening method for subjects with social and/or cognitive disorders. Graphic competence was compared with cognitive capacity. Geometric copying, handwriting and freehand figure-drawing capacities were shown to drop in a prescribed order with decreasing cognitive functioning. Copying a three-dimensional cube was the most sensitive to cognitive derangements, and signature writing the least sensitive. These two tasks represent the extremes of a scale which also included performance on other copying tasks including handwriting ability and freehand figurative drawing. As a whole, the proposed graphic test technique seems less sensitive to cultural and educational factors, including verbal factors, than ordinary measurements of mental functioning.

The child develops its drawing and writing capacity during the first twelve years of its life (1). From the study of a number of drawings produced by elderly people in institutions, that corresponded to those made by children aged four to twelve, the question arises, "Does everybody regress in the capacity to draw a figure as a product of getting older—or is it a function of a degenerative process in the brain? A review of the literature shows that very few studies have been done on the progression of freehand figure drawing (FFD) in the aged as related to cognitive functioning level.

After having studied 1,500 drawings from elderly people, 75 years or older, we can say that the drawing level reached during childhood probably stays the same through most of life—that is to say, normal aging does not increase graphic capability. It is possible that a long period of institutionalization in a less stimulating environment can influence the capacity to produce graphics, but this is not yet shown. However, when there is a degenerative process in the brain, as in senile dementia (SD), drawing capacity seems to regress in about the same time period (ten to fifteen years) as the original drawing development during childhood.

BACKGROUND ON DEMENTIA

Senile dementia (2) is a cortical and subcortical lesion in the brain characterized by the presence of amnesia (memory loss), aphasia (language impairment) and apraxia (inability to carry out motor activities despite intact comprehension and motor function). Even if non-verbal information is involved later (3) in the dementia process than verbal, it should be included in the early stages of study of the dementia syndrome even though it may have an unclear diagnostic profile. Furthermore, there are certain connections between aphasia, apraxia and agraphia (loss of the ability to write a spontaneous, legible sentence).

APHASIA AND APRAXIA

Aphasia is often observed before proper apraxia is developed (4) although apraxia can also be seen in patients with good language function (5). Apraxia is often observed (70-80 percent) in senile

dementia (6). The apraxia in dementia (i.e., disturbances of represented space) progresses in an order which is the reverse of the normal acquisition of praxic functions during childhood (7). First to be involved is constructional apraxia, (i.e., copying a three-dimensional figure), which has been shown to be associated with the presence of focal organic cerebral lesions (8,9). Dementia regression subsequently involves ideomotor apraxia (movement performance on verbal command) and ideational apraxia (serial actions requiring the use of several objects to achieve an intended goal 5).

AGRAPHIA AND DEMENTIA

Agraphia is a common feature in Alzheimer dementia (10) and is related to the severity of the dementia (11). By means of a test of spontaneous writing, diagnosis of apraxia and aphasia (as detected by agraphia), could, in principle, gain from including tests of copying and freehand figure drawing (FFD) abilities. These tests might also reveal a reduction in copying ability in normal old age. Nondisturbed aged people do sometimes show difficulties on tests of immediate reproduction of line drawings and of space representation (12). In these normal aged subjects, however, perspective remains unchanged(7). Moreover, FFD is sensitive to changes in personality-connected cerebral lesions (13). Thus, to employ graphic tests with their diagnostic potential for aphasia, apraxia and personality changes would be in line with the diagnosis of dementia according to the *Diagnostic and Statistical Manual of the American Psychiatric Association* (14). Graphic incapability may indeed indicate a dementia in progress.

FACILITY IN FREEHAND FIGURE DRAWING (FFD)

The nine primary details drawn (arms and legs in two dimensions; clothes; shoulders; good body proportions; hair; movement, i.e., arm joints; glance, i.e., pupil directed; general coordination) disappear in a fixed order with decreasing cognitive functioning. It is noteworthy that the order of the loss of these details is the inverse of the order observed during the development of the child (1). For example, in FFD only non-figurative

drawings (i.e., circle and scribble) are observed in people who score below ten out of thirty on the Mini-Mental State Examination (MMSE [15]). This cutoff point of ten often represents the necessity of institutional care, when these patients cannot any longer function or be grouped with others, which is a requirement for a day care center. However they can still live in a group facility for the demented, where there are staff present all the time.

The decrease in higher cortical functions is first observed in the copying of complex geometric figures and in the writing of a spontaneous sentence. Moreover, our studies show that, to some extent, the different tasks of copying geometrical figures, of writing sentences, of FFD and of writing a signature are interchangeable as tests for cognitive functioning. This may be useful where a person who does not want to cooperate in producing an FFD may, instead, be interested in completing the sentence writing tasks and the geometrical copying tasks. Thus, we are able to evaluate the state of cognitive functioning from a subset of these parameters. However, on the whole, one will obtain more complete information concerning a person's cognitive functioning when all these graphic measures are combined (16,17). See figures 1-4.

There are significant correlations between cognitive dysfunction and dependent living needs. Sweden has about 8.3 million inhabitants, and 1.45 million (17.4 percent of the population in 1985) were ages 65 years or older (18). More than 20 percent of this group needed care, with institutional care being necessary for 7.3 percent and home help care for 13.5 percent. This study supports Adolfsson, who reported that 10.3 percent of the population age 65 and older was institutionalized in Northern Sweden (19).

Dementia requires adequate functional maintenance and information that facilitates support from family (and community), even in an early stage. These fortify the contact between caring relative and the patient, and also support a prolonged period of an acceptable perception of reality in the patient. Thus, the con-

tributions aim to facilitate home care. It has been observed (20) that older couples can maintain considerable independence by caring for one another, by developing closer relationships with kin or friends (21,22,23). This minimizes premature institutionalization (24). The feeling of being in control or of not having anything to say over what happens in one's life has far-reaching consequences for both physical and mental health (25,26).

There might be different characteristics observed in elderly subjects who are involved in the institutionalization process, such as forgetfulness and confusion (27), and dependency in activities of daily living (28,29,30). If identification of subjects in need of institutionalization can be made in the earlier stages of organic cerebral diseases, it would make proper planning of future housing needs possible. Cognitive dysfunction with constructional and visual-spatial disabilities can be measured from FFD, copying of geometrical figures, and sentence and signature writing (31, 9, 32, 33, 13, 34). Those subjects living independently in the community made drawings of a considerably greater representative ability (i.e., more body details) than their neighbors who were living collectively. In institutions, there were only about one-fifth who were capable of presenting a figurative drawing, and one-in-ten made a non-figurative drawing or scribble (35).

It has been stressed (36) that living arrangements, especially the presence of a family caring unit, is a critical factor in predicting placement of chronically ill/disabled elderly. Understimulation is frequently encountered by the elderly, particularly in those staying in an institution because of dementia. One way to ameliorate understimulation is to stimulate and initiate active participation in different activities. A central component in the activation program is to stimulate social interaction with other people.

But at the same time, we must be careful not to induce what has been labeled "learned helplessness" and thus be at risk of hastening, through a series of events known as "the social breakdown syndrome," the elderly becoming institutionalized

(37). By using the patient group as a resource, we can change the staff's attitude towards the patient, including introducing a belief that the patient is willing and capable of doing more than he believes. The staff can also learn not to redo the mistakes, to "take over" the responsibility for the patient's life, resulting in "learned helplessness" (38).

In summary, the FFD is non-verbal, inexpensive, a simple and quite rapid method of screening for cognitive dysfunction in old age. This method might be used by most categories of professionals in medical care. There may be an advantage when the patient does not consider the drawing tasks as a test situation but as part of a rehabilitation activity; this could provide better results. For demented subjects, non-verbal tasks like FFD may be more pertinent for calculating the mental functioning of subjects without major somatic handicaps. Tests of drawing ability require accurate perception of the visual stimuli, accompanied by intact motor functioning. This might be a disability for the screening of cognitive dysfunctioning in subcortical and vascular dementia processes with motor or sensory complications.

TABLE 1 **RELATION OF SCORES TO HOUSING TYPES**

	Independent Housing		**Dependent Housing**
Participation	In community (n=515)	In collectivity (n=48)	In institution (n=157)
Mental status			
MMSE, scores/30	25	21	9
Free-hand figure drawing			
Figurative drawing, %	74	52	18
Non-figurative drawing,%	1	2	11
Incapability,%	3	6	50
Non-cooperation, %	22	40	21

Figure 1 Score analysis for graphic functioning in the elderly

Elements in writing a signature

5 pts Fluent style
4 pts Missing fluent style
3 pts Deformed letters
2 pts Repetition or change of letters
1 pt Scribble
0 pt Non-cooperation

Elements in writing a complete sentence

5 pts Correct (verb, subject and makes sense)
4 pts Missing the sense
3 pts Missing the verb or subject
2 pts Write a single word or letter
1 pt Scribble
0 pt Non-cooperation

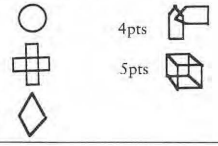
Elements in writing a sentence at dictation

5 pts Correct (with no faults)
4 pts Missing preposition
3 pts Missing verb or noun
2 pts Missing 3 or 4 words
1 pt Scribble
0 pt Incapable of writing or non-cooperation

Copying geometric figure

maximum score is 15

1 pt
2 pts
3 pts
4pts
5pts



Caring form

Day care center
Geriatric ward
Dementia unit
Nursing home

Housing form

Independent in community or collectivity

Dependent in group living or in an institution

Mini-Mental State Examination (MMSE)

maximum score is 30

Free-hand figure drawing scores

maximum score is 15

15 pts Glance
14 pts Movement
13 pts General coordination
12 pts Pupil
11 pts Hair
10 pts Shoulders
9 pts Correct body proportion
8 pts Lower extremities two-dimensions
7 pts Higher extremities two-dimensions
6 pts Clothing
5 pts Stickfigure
4 pts Headfooter
3 pts Circle
2 pts Write a word or letter
1 pt Scribble
0 pt Non-cooperation

Figure 2-4 Examples of graphic functioning demonstrations by the elderly

Sex Female Age 86

Housing form Dependent

Caring Form Geriatric ward

MMSE scores /30 23

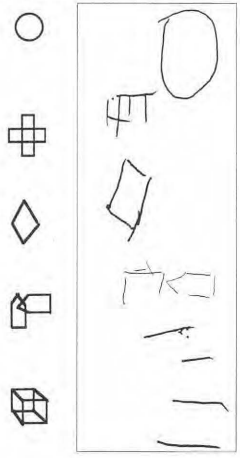
Signature writing /5 5

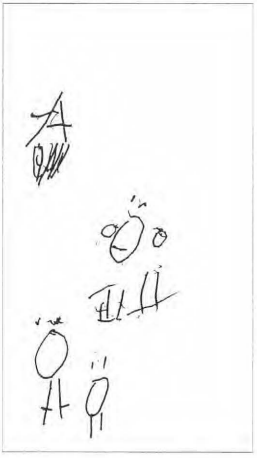
Writing a complete sentence /5 5

Sentence writing at dictation /5 5

Copying geometric figures scores /15 4

Free-hand figure drawing scores /15 4





Sex Female Age 89

Signature writing /5 4

Sentence writing at dictation /5 5

Housing form Dependent institution

Caring Form Dementia unit

MMSE scores /30 9

Writing a complete sentence /5 2

Copying geometric figures scores /15 1

Free-hand figure drawing scores /15 4

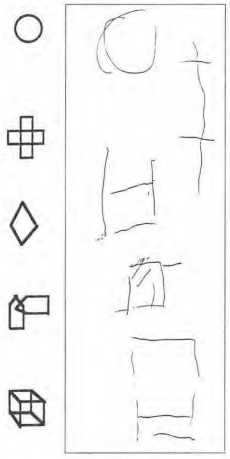


Figure 3

Sex Male Age 91

Signature writing /5 5

Sentence writing at dictation /5 5

Housing form Independent community

Caring Form —

MMSE scores /30 30

Writing a complete sentence /5 5

Copying geometric figures scores /15

Free-hand figure drawing scores /15

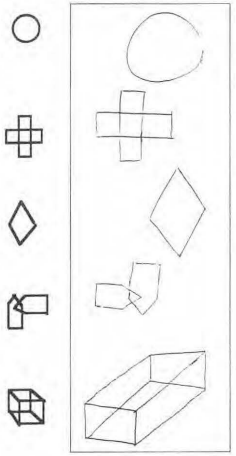


Figure 4

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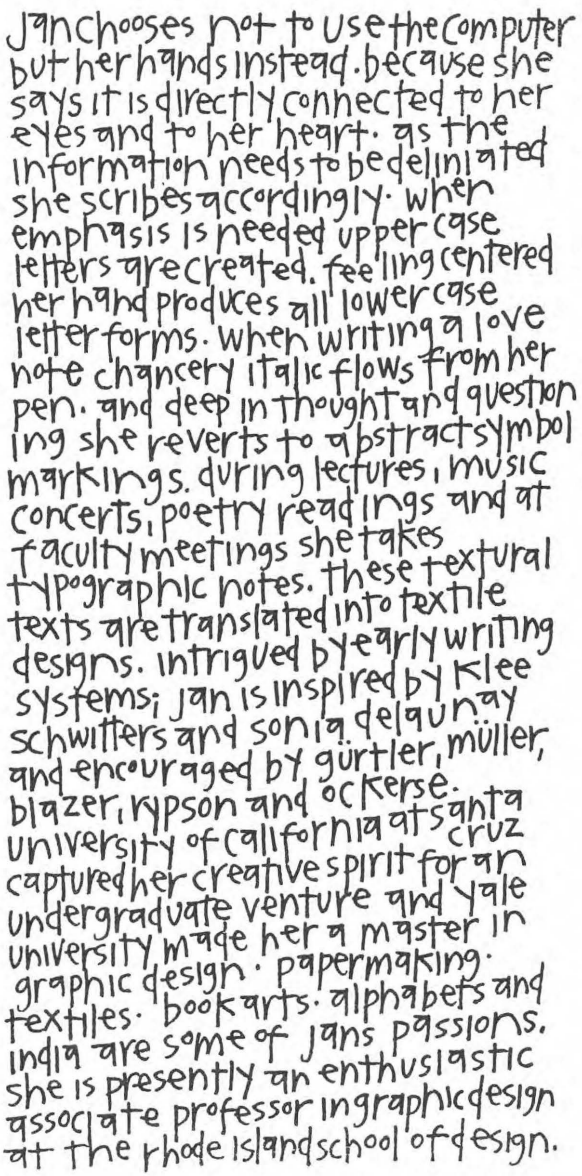

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