

Backwards Writing: An Unexpected Ability in Writing*

ALFREDO ARDILA

Instituto Neurologico de Colombia

SUMMARY: The case of a left-handed female patient is described who presented serious problems in learning how to write during childhood, particularly in relation to directionality and letter sequence. The patient then learned to write correctly with her left hand, but practiced and maintained her ability to write backwards (from the last letter to the first). Implications of the case are discussed.

KEYWORDS: Writing disturbances, left-handedness, inverse writing

Different types of alterations in writing have been described in the literature which even include disorders of a hysterical type (Benson and Cummings, 1985). However, alterations characterized by writing backwards (from the last letter of the word to the first) have not been reported in the literature. From the practical and conceptual point of view, this would seem to be almost impossible. Quite coincidentally, we had the opportunity to analyze a case of this type.

CASE REPORT

History

This is a 23 year old female patient, a secretary by profession, without any significant neurological antecedent. She was hospitalized on presenting episodes of global headache with a month's evolution and loss of consciousness lasting a few minutes. The day after the episode, the patient presented a sensation of numbness, and a deviation of the corner of her mouth to the right. Further, the patient was unable to move her left arm, and left-side paresthesias were subsequently observed. During her admittance examination 24 hours later, certain left motor neglect and discrete left hypoesthesia were only observed. However, there was no extinction when confronted with double tactile stimulation. Cranial nerves, muscular tone, motor coordination, gait and strength, were all within normal limits. Reflexes were also normal. Enhanced CT scan performed two days later was normal. A diagnosis of an ischemic vascular accident in remission was proposed.

Neuropsychological examination disclosed a collaborative, well oriented patient. Her total IQ in the WAIS was 108 (VIQ = 97, PIQ = 110). Language comprehension, repetition, naming and reading, were normal. Memory abilities according to the Wechsler Memory Scale, were found to be within normal limits. No ideomotor or ideational apraxia were observed, although the patient presented a slight tendency to use the body part as the object (two out of ten movements). In the copy of the Rey-Osterrieth Complex Figure she obtained 32/36 (Lezak, 1983). Spatial deficits were not observed: she localized points in a map, she could draw and read a clock, she drew the map of her room and distinguished different points; she did not present difficulties in right-left discrimination, and Rey-Osterrieth Complex Figure was spatially adequate. There were no signs of hemispatial neglect. It was interesting to note however, that when asked to write words or sentences to dictation, the patient began to write the last letter of the last word and wrote from right to left.

A 55-item hand preference inventory was presented (Healey, Liederman, and Geschwind, 1986). A score of -0.45 was obtained ($+1.00$ represents an extreme right-handedness; -1.00 represents an extreme left-handedness). The patient presented a left preference when using her feet and ears, and a right preference when using her eyes. Family history of left-handedness was negative.

Analysis of Writing

The patient reported major difficulties on learning to write during childhood, with a tendency to invert the order of the letter and the direction of writing. As a result of this difficulty, she tried to write with her left hand and with this hand was able to learn to write adequately. However, she maintained and practiced the ability to write backwards with her right hand. Some years later, she also began to write normally with her right hand. At present, she can write towards the right and towards the left with both hands, but says that she prefers to write towards the left with her right hand, and towards the right with her left. The same applies when writing numbers with several digits. She also signs backwards with her right hand but can also sign towards the right (Fig. 1). The patient uses a typewriter, as a matter of routine, with no difficulty. When she takes down shorthand, she can take down long clauses in the order in which they are dictated. However, when short clauses are dictated, she writes them backwards (from the last word to the first).

It was observed that the patient's writing speed with her right hand remained the same whether writing forwards or backwards, but she tended to omit letters in long words (v.gr. "dactilografía", handwriting) when writing towards the left. In both cases, she could write sentences that did not exceed the limit of the operative memory (approximately seven words)

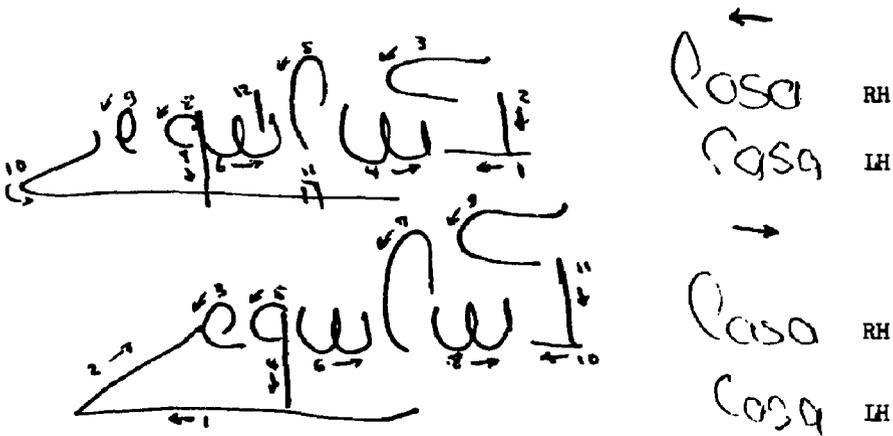


Fig. 1. Patient's signature and samples of writing performed with right hand (RH) and left hand (LH). The direction in which the movements were made in signing and the order in which each outline or letter was made are shown.

(v.g., "el carro verde corre a gran velocidad", the green can runs at a high speed). The movements performed when outlining each letter were the same no matter which direction she wrote in (except for the letters "m" and "n"). She performed the forward spelling of words at a normal speed, but her spelling backwards of words was markedly slower. She did, however, spell backwards at a much faster speed than normal. When memorizing digits, the patient retained six digits forwards and four backwards. She always read words written on cards from left to right.

When asked to count aloud (1, 2, 3, . . .) while writing words which were dictated to her, it was observed that there was no interference while writing from left to right (ten names of animals in one minute), but there was a partial interference while writing from left to right (six names of fruits in one minute), even though she did manage to complete the task.

COMMENTS

Our patient presents an extremely unusual writing ability: she signs from right to left, can right in both directions with either hand, and can even write a short clause backwards in shorthand. She does not change hand position when writing with either hand and says that she does not revisualize the words in order to be able to write them backwards.

The skill shown by our patient in writing backwards, is not only conceptually incomprehensible but is also practically inadequate. Language comprises a sequence in one particular direction. Phonemes and syllables acquire meaning in discourse when related to previous and subsequent

units. Precisely for this reason, it is relevant to ask why such an extravagant ability has been developed and maintained.

Inversion of letters and mirror writing has been observed in dyslexic children, as well as the tendency to invert the letters sequence in a word ("was" → "saw") (e.g. Critchley 1985). Some left-handers also present the ability for mirror writing, particularly when writing with the right hand (Harris 1980); Leonardo da Vinci is the most classical example. In our personal experience, we had the opportunity to observe a right-handed girl who, during a couple of weeks of suffering herpetic encephalitis, presented mirror writing with her right hand.

Our patient could probably be considered a pathological left-hander (Satz 1972, 1973, Satz et al. 1985). She presents a negative history of familial sinistrality, and very likely, right-sided speech representation. Although verbal IQ is 13 points lower than performance IQ, it might be considered to be a mild sequelae of her right hemisphere ischemic accident. Nevertheless, visuospatial functions are not impaired. It has been observed that left-handers when forced to use their right hand in writing, can present decreased spatial abilities (Ardila et al. 1988). However, our patient is not really a "forced" left-hander. As a matter of fact, she can write with both hands. Initially, she tried (or was pushed) to use her right hand when writing, but latter, began using her left hand. At the present time, she writes normally with her left hand, as she is left-handed. In addition, she has maintained (through training, we can suppose) her ability to write backwards with her right hand; finally, she can write in both directions with either hand.

It is necessary to emphasize that Spanish has almost a complete phonological writing system. As a consequence, spelling (or breaking down a word into syllables) is a task which presents a very low level of difficulty. Indeed, some children and adolescents play a game in which they say each word with the syllables in the reverse order: /kasa bonita/ "beautiful house" → /saka tanibo/. Prevalence of dyslexia is lower in Spanish than in English (Bravo-Valdivieso, 1988), probably due to the fact that rules of conversion between oral and written language are simpler in the former. By the same token, alexias and agraphias resulting from focal brain damage, are not completely equivalent in Spanish and English, and psycholinguistic models developed in English (e.g. Marshall and Newcombe 1973, 1980) apparently can not be applied to languages like Spanish (Rosselli, Ardila and Pinzon, 1989).

As this is such an extraordinary unusual and bewildering ability from a conceptual and practical point of view, we can propose that:

1. this may be a case of a pathological left-hander, who experienced major problems learning to write with her right hand during childhood, particularly, in relation to proper direction and letter sequence
2. initially, the patient preferred to write with her left hand, and eventually managed to do so adequately.

However, she practiced and developed the ability to write backwards with her right hand, perhaps as a game, or an exotic ability. It is evident that the patient has explored written language from left to right. Interference when performing another task simultaneously (counting out loud) is greater when writing backwards, but the patient nevertheless manages to perform the task. We can suppose then, that this is a case of a highly trained skill, although it was originated from childhood problems in learning to write.

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NOTE

* Send Correspondence to Dr. Alfredo Ardila, Miami Institute of Psychology of the Caribbean Center for Advanced Studies, 8180 NW 36 Street, Second floor, Miami, Florida 33166-6612.

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