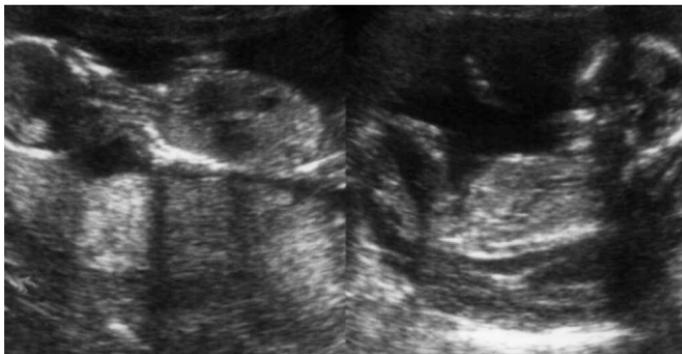


## Of Geminates and Gemellology

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Twins have always attracted attention—Romulus and Remus, Castor and Pollux, Jacob and Esau, Fafner and Fasold; there has always been intrigue, mystery and confusion surrounding two-in-one and one-in-two. The interest for *Laterality* and lateralisation is compounded, because if it is the difference between an individual's two sides that results in laterality, how are those two sides represented in twins, particularly monozygotic twins that once were one? This Special Issue of *Laterality* clearly indicates a continuing interest in the relationship of twinning and laterality, and it is a particular pleasure to include both biological and neuropsychological papers. The editors' job has been particularly easy since all but one of the papers were submitted spontaneously, and the only editorial tasks were the pleasant ones of putting them together, and writing a light-hearted introduction to accompany the heavier but extremely interesting scientific fare that follows. Finally, although I've long been interested in twins professionally (McManus, 1980), I now have two more reasons for fascination. The ultrasound scan below, at fourteen weeks of gestation, shows the first glimpse of our daughters Franziska and Anna, born on June 25th 1999 just as the journal went to press. This Special Issue is dedicated to them and to Christine.



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The problems of asymmetry and twinning start even with the very words themselves. Both words are what are called ‘geminates’, the term derived from the Latin verb *geminare* (to double), and hence *geminus*, meaning twin (as in the Gemini of the zodiac), and *gemellus*, the diminutive form. A geminate is therefore a word with twinned letters (although there are also technical meanings in botany, architecture, chemistry and molecular genetics). Geminate words sometimes but not always produce spelling problems<sup>1</sup> for the unwary, particularly when, as in **asymmetry**, the English pronunciation would hardly be changed if all the letters were double or single: **\*asymetry**, **\*assymetry**, **asymmetry** and **\*assymetry** would all be spoken in an essentially similar way. The correct spelling is therefore particularly difficult to remember (unlike a word such as **twinning**, which if it were spelled as **twining** would be pronounced with a long rather than a short ‘i’). As a result geminates have always been particular favourites for school spelling tests, and those of us drilled to spell words such as **accommodation**, still wince on seeing **\*acommodation** and **\*accomodation** on almost every student notice board. Particularly distressing is that there is undoubtedly an exposure effect, repeated occurrences of the wrong spelling eventually making one doubts one’s own memory and go scurrying back to the dictionary for reassurance.

Problems with geminates are surprisingly pervasive. The London *Independent on Sunday* (1996, 12th May, p. 16) told two related geminate stories. The more benign merely embarrassed the Reuters News Agency who in a memorably erroneous and pointless correction announced: ‘In Colombo story headlined ‘Sri Lanka **desiccated** coconut sector future unclear’ please read in headline and second para ... **desiccated** coconut ... instead of **\*dessicated** coconut’<sup>2</sup>. The second story concerned a drugs smuggler who had the bright idea of importing hashish in tin cans, each of which had its own carefully printed labels identifying it as “**\*dessicated** coconut”. Unfortunately the Customs Officer could spell properly, and immediately got out his can opener ...

Foreign geminates can be particularly problematic: London cafes and restaurants currently have an epidemic of selling **\*capuccino**, rather than **capuccino**; my local restaurant even has **\*rissoto** rather than **risotto**. The problem is that the double letters are phonemic in Italian—they are pronounced differently from single letters, and that matters in a language with strict grapheme-phoneme translations. Italians therefore find it easier to know how to spell them (or at least I have yet to see a **\*capuccino** for sale in Italy). From a linguistic point of view these phonemic geminates are treated as two separate consonants, one attached to the previous vowel, and one to the following vowel

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<sup>1</sup> To avoid confusion, I will adopt the traditional linguistic nomenclature of putting an asterisk in front of words which are not legitimate spellings, and when words are being discussed as words will put them in bold.

<sup>2</sup> I have added emboldening and asterisks in all quotations.

(**cap-puc-cino**); Latin languages seem here to be systematically different from Germanic (Delattre, 1971). The phonetic difference is a matter of subtleties of timing, and it is therefore interesting in the context of handedness (McManus & Cornish, 1997) that the perception and production of geminates may be cerebellar in origin (Ivry & Gopal, 1993).

What about **asymmetry**? Is there a particular problem with that word? Here accurate information is relatively easy to find. A few years ago I searched MedLine and PsycLit and produced the following statistics:

	<i>PsycLit</i>	<i>MedLine</i>
<b>asymmetry</b>	2935	8311
* <b>asymmetry</b>	4	16
* <b>asymetry</b>	1	32
* <b>assymetry</b>	10	38

The papers cited in MedLine seem to be marginally more likely to make the errors. Surprisingly all three erroneous forms are fairly prevalent, and these are probably lower bounds on their occurrence since editors, proof readers and spell checking software will no doubt have weeded out many others before they arrive in print. Lest it be worried that these problems are errors of re-keying at MedLine and PsycLit, a few examples will show that is not the case. A paper in *Nature* (Lowe et al., 1996) managed to have **\*asymetric** in its table 1, despite having **asymmetric** in the title; John Ziman's book *Reliable Knowledge* (1978) suggested "our universe is uniquely **\*asymmetrical**" (p.58); and most bizarrely of all, and probably reflecting a somewhat different type of error, *The Lancet* managed to come up with **\*asymmetry** (Newton & Seagroatt, 1993)—a so-called perseverative dysgraphia, reported as specific to geminates (Venneri et al., 1994). Errors are not confined to the word **asymmetry** itself. Of interest to workers in laterality, is Schiller's usage, in his biography of Broca, of **\*corrolary** rather than **corollary** (Schiller, 1979); here, as so often seems to be the case, there seems to be some internal cognitive code that the word is somehow asymmetric, meaning that when one letter is doubled, another is shortened in compensation, thereby restoring the asymmetry. In an unusual example where the erroneous form seems to be the norm, in their chapter for the *Blackwell Dictionary of Neuropsychology*, Sandra Witelson and Phil Bryden commented that **dichhaptic** is more often spelled wrongly than rightly (Witelson & Bryden, 1995), as **\*dichaptic**—presumably reflecting an incorrect folk etymology, as also occurs for that most frequently mis-spelled of medical words, **pruritus** (McManus, 1995). Finally, lest I might be thought holier than thou, and since I know that Michael Corballis will tell the story if I do not, I remember writing to him in the early 1970s when I was an undergraduate,

enclosing a manuscript I had written; the charming letter in reply had the gentlest of admonishments: “you should notice **asymmetry** itself has an asymmetry which you have neglected”.

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