42 · SEMANTIC DEVELOPMENT

The learning of vocabulary (§17) is the most noticeable feature of the early months of language acquisition. From the point when a child's 'first word' is identified, there is a steady lexical growth in both comprehension and production. An indication of the scope and speed of progress can be obtained from a study of American 1-year-olds: the average time it took eight children to get from 10 to 50 words in production was 4.8 months – about 10 new words a month. In comprehension, the children understood an average of 22 new words each month (H. Benedict, 1979). By 18 months, it is thought that most children can speak about 50 words and understand about five times as many.

THE CONTENT OF EARLY VOCABULARY

Young children talk about what is going on around them – the 'here and now' – and rapidly build a vocabulary in several semantic fields (p. 104).

- *People* mainly relatives and house visitors – *daddy, baba, grandma, man, postman.*
- *Actions* the way things move (*give, jump, kiss, gone*), and routine activities in the child's day (*bye-bye, hello*).
- *Food* occasions as well as products – *din-din, milk, juice, drink, apple.*
- *Body parts* usually facial words first (*mouth, nose*), then other areas (*toes, handie(s)*) and body functions (*wee-wee*).
- *Clothing* of all kinds – *nappy/diaper, shoes, coat.*
- *Animals* whether real, in pictures, or on TV – *doggie, cat, horse, lion.*
- *Vehicles* objects and their noises – *car, choo-choo, brrm.*
- *Toys and games* many possibilities – *ball, bricks, book, dolly, peep-bo.*
- *Household objects* all to do with daily routine – *cup, spoon, brush, clock, light.*
- *Locations* several general words – *there, look, in, up.*
- *Social words* response noises – *m, yes, no,* ta.
- *Describing words* early adjectives – *hot, pretty, big.*
- *Situational words* several 'pointing' words (deictics, p. 106) – *that, mine, them.*

HOW MUCH DO CHILDREN SAY IN A DAY?

Using radio microphones and tape recorders, it is now possible to make large-scale surveys of children's lexical usage. Large portions of a child's day can be recorded – in some cases, covering everything the child says between waking up and bedtime.

The table below gives the age of several German children recorded in one study, along with the length of the recording, and the number of word tokens (§15) used in the recording. As the recording times are not the same, the right-hand column gives a standardized total, based on an assumed 12-hour day.

Age (years; months)	Time (mins.)	Tokens	12-hr total
1;5	202	3,881	13,800
1;8	241	3,907	11,700
2;1	213	5,978	20,200
3;6	189	9,891	37,700
5;4	152	6,464	30,600
8;7	193	6,630	24,700
9;2	311	10,524	24,400
9;6	869	25,401	21,000
9;7	804	28,142	25,200

These results far exceeded the expectations of the researchers. No-one had imagined that children as young as 2 could produce in excess of 20,000 words in a day, or that a 3½-year-old could produce nearly twice that number!

The number of different words (word types, §15) used during the day was also much larger than had been expected. These ranged from a remarkable 1,860 (for the 1;5-year-old) to over 5,000 for an 11-year-old, with an average of 3,000 for the whole group. (After K. R. Wagner, 1985, p. 477.)

No corresponding survey has yet taken place for English. But as the children came from a variety of social backgrounds, and engaged in many kinds of activity during their day, it is likely that the figures will be fairly typical – in which case, traditional impressions of children's vocabulary growth (p. 234) will have to be radically revised, in an upward direction.

THE MEANING OF EARLY WORDS

Children do not learn a word with its meaning 'ready made'. They have to work out for themselves what it must mean, and in so doing they make errors. Three types of error occur often during the second and third year.

1. *Overextension* A word is 'extended' to apply to other objects that share a certain feature, such as a common property of shape, colour, or size. *Dog* might be applied to other animals, or *moon* to other round objects.

2. *Underextension* In this case, the word is used with a narrower meaning than it has in the adult language. *Dog* might be applied only to the family dog, or *shoes* only to a child's own shoes.

3. *Mismatch* Here, there is no apparent basis for the wrong use of a word by the child, as when in one case a telephone was referred to as a *tractor*. There is usually no way of tracing back the association of ideas that has caused such misidentifications.

THE FIRST 50 WORDS

These are the first 50 words used by two American children between 11 and 16 months. There are very few items in common, and major differences in order (e.g. *mommy* is Sarah's second word, but Daniel's forty-third).

	Daniel	*Sarah*
1.	light	baby
2.	uh-oh	mommy
3.	what's that	doggie
4.	wow	juice
5.	banana	bye-bye
6.	kitty	daddy
7.	baby	milk
8.	moo	cracker
9.	quack	done
10.	cookie	ball
11.	nice	shoe
12.	rock (noun)	teddy
13.	clock	book
14.	sock	kitty
15.	woof-woof	hi
16.	daddy	Alex
17.	bubble	no (-no)
18.	hi	door
19.	shoe	dolly
20.	up	what's that?
21.	bye-bye	cheese
22.	bottle	oh wow
23.	no	oh
24.	rock (verb)	button
25.	eye	eye
26.	nose	apple
27.	fire	nose
28.	hot	bird
29.	yogurt	alldone
30.	pee-pee	orange
31.	juice	bottle
32.	ball	coat
33.	whack	hot
34.	frog	bib
35.	hello	hat
36.	yuk	more
37.	apple	ear
38.	Big Bird	night-night
39.	walk	paper
40.	Ernie	toast
41.	horse	O'Toole
42.	more	bath
43.	mommy	down
44.	bunny	duck
45.	my	leaf
46.	nut	cookie
47.	orange	lake
48.	block	car
49.	night-night	rock (noun)
50.	milk	box

(After C. Stoel-Gammon & J. A. Cooper, 1984, p. 264.)

CUPS AND GLASSES

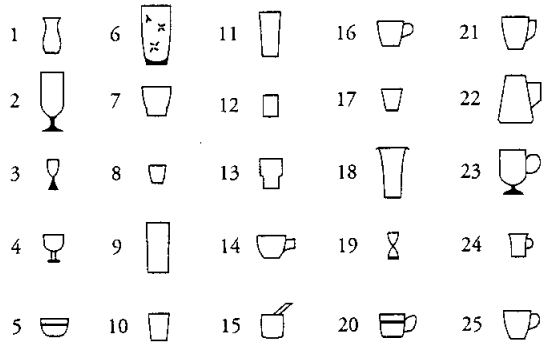
Children can take several years to learn the meaning of a word, especially when the word is used along with others to refer to objects or ideas that are not easy to distinguish. Even everyday objects may prove difficult to differentiate and label in a consistent way – such as the distinction between 'cups' and 'glasses'.

The uncertain boundary between these categories is well illustrated from the 25 drinking vessels drawn in the diagram below. For adults, some of these are clearly cups, some are clearly glasses, and some require a more complex kind of description. How long does it take children to become aware of these distinctions?

Children aged between 3½ and 12½ were shown this set of objects, and asked to carry out various tasks, such as naming, defining, and sorting. The youngest children used far fewer names to describe the objects, often overextending the word *cup* to apply to items which the 12-year-olds called *glass* (e.g. items 4 and 9 in the diagram). One 3-year-old went the other way, calling most things *glass*, and keeping *cup* for the smallest items.

Both *glass* and *mug* came to be used regularly by the 6-year-olds, who also added such labels as *dish* and *vase*. A still wider range of labels was used by the older children (e.g. *eggholder, can, measure*). During this period, also, there was an increasing use made of words reflecting the perceptual properties of the objects – especially their size, shape, and material (e.g. *big, round, paper*). However, between 6 and 9, the children's preferences showed a clear change: the older they became, the more they preferred to use attributes reflecting what they thought were the functional properties of the objects (e.g. *medicine cup, Martini glass*).

By age 9, some quite subtle distinctions were being made, with the names and definitions showing that the children were beginning to be aware that they were dealing with an area where boundaries are vague. This is most clearly shown from the definitions they gave, which contained qualifying words, such as *usually* or *could have*; for example 'a cup holds things to drink, and sometimes has a handle...', 'a glass is like a cup only it could be taller, doesn't have a handle, and could be plastic or glass'. It is age 12 before competence becomes close to that of an adult – nine years or more after the distinction is first introduced. (From E. S. Andersen, 1975.)



FOUR REPLIES

Age 3	*Age 6*	*Age 9*	*Age 12*
1. cup	glass	glass	fruit cup
2. big cup	glass	glass	wine glass
3. little cup	glass	a measure	cup for liqueur
4. little cup	glass	glass	juice glass
5. big cup	dish	little tiny dish	fruit cup
6. big cup	glass	glass	glass
7. cup	glass	cup	glass
8. little cup	plastic cup	glass	medicine cup
9. big cup	plastic cup	glass	glass
10. cup	plastic cup	cup	outdoor cup
11. Ron McDonald cup	plastic cup	glass	Ron McDonald happy cup
12. little cup	plastic cup	cup	cup
13. cup	glass	glass	cup
14. big cup	cup	cup	coffee cup
15. coffee cup	plastic cup	cup	sipper cup
16. cup	cup	cup	coffee cup
17. paper cup	paper cup	cup	Dixie cup
18. big cup	cup	glass	glass
19. orange cup	metal cup	measure for wine	measuring cup
20. little cup	metal cup	cup	baby's metal cup
21. coffee cup	mug	coffee mug	coffee cup
22. coffee cup	glass cup	cup	beer mug
23. coffee cup	glass (mug)	cup	mug
24. cup	glass	cup	coffee cup
25. cup	cup	cup	coffee cup

After the age of 18 months, very little precise information is available. By age 2, spoken vocabulary probably exceeds 200 words. But after this, estimates become extremely vague. A dramatic increase in the size and diversity of the lexicon takes place during the third year, so much so that it has not yet proved possible to make accurate calculations (especially about vocabulary comprehension), or work out any norms of spoken lexical frequency. What happens at older ages is largely guesswork, and vocabulary totals cited for these children should therefore be viewed with great caution.

Other issues

The study of semantic development takes in far more than vocabulary (p. 107). Grammatical constructions also need to be studied from a semantic point of view – for example, the way in which children master the complex conditional meaning of *if* constructions, or the causal meaning of *because, so,* or *since.* That there are problems here can be readily shown from the errors children make:

The man's fallen off the ladder because he's broken his leg.
I had one fish left, because its name was Bill.

Children aged 8 or 9 may have mastered the grammar of such constructions very well, but still be having difficulty with the meanings they encode. Auxiliary verbs such as *ought, must,* and *should* provide another problem area, as do subtle prepositional forms (e.g. *despite*) and verb contrasts (e.g. *ask* vs *tell, say* vs *promise*). The ability to use figurative expressions, and to see double meanings in language, also develops largely after the age of 6.

One of the most significant developments of this later period is the child's emerging ability to integrate several features of semantic knowledge into a single defining statement. Young children cannot define: in response to such questions as 'What's X?', they give empty, ambiguous, or idiosyncratic replies. *What's a shoe?* asked an adult. *That,* replied one young child, pointing. *And a sock,* replied another. *Mummy got a shoe* replied a third. Gradually, however, definitions become more sophisticated. A particular feature is singled out (*A knife is sharp*) or its function is specified (*A knife is when you cut with it*). But it is not until around age 8 or 9 that statements with something resembling an adult definitional form begin to be produced (*An apple is a sort of fruit, and it's round and red, and we eat it*). (B. Litowitz, 1977.)

Semantic development continues throughout the school years – and, indeed, throughout adult life. Unlike phonology and grammar, it is not largely over when children enter their teens. There is always new vocabulary to be learned, and new worlds of meaning to explore.

43 · PRAGMATIC DEVELOPMENT

The task of language acquisition requires that children learn much more than patterns of sound, grammar, and vocabulary. They must also learn to use these patterns appropriately in a rapidly increasing range of everyday social situations. This developing *pragmatic* awareness (§21) has attracted a great deal of study in recent years, particularly in relation to the way children learn strategies of conversational interaction. It is not yet possible to talk about definite stages of development; but the very early age at which these strategies emerge is now clearly established.

CONVERSATIONAL SKILLS

Between the ages of 2 and 4, a remarkable development takes place in the ability of the child to participate in a conversation. At the earlier age, conversations are often very erratic and disjointed, with parents doing most of the 'work', and children using sequences of utterances, many of which are not obviously directed to any listener. The effect is a curious mixture of monologue and dialogue:

CHILD: Ball. Kick. Kick. Daddy kick.
MOTHER: That's right, you have to kick it, don't you.
CHILD: Mmm. Um. Um. Kick hard. Only kick hard.
Our play that. On floor. Our play that on floor. Now.
Our play that. On floor. Our play that on floor. No that.
Now.
MOTHER: All right.
CHILD: Mummy, come on floor me.
MOTHER: Yes.
CHILD: You tip those out.
MOTHER: Mm. All right.
CHILD: That one broke.

(P. Fletcher, 1985, p. 64.)

The contrast with a 3-year-old's conversation is striking, with both parties very much involved with the detail of what each is saying:

CHILD: Hester be fast asleep, mummy.
MOTHER: She was tired.
CHILD: And why did her have two sweets, mummy?
MOTHER: Because you each had two, that's why.
She had the same as you. Ooh dear, now what?
CHILD: Daddy didn't give me two in the end.
MOTHER: Yes, he did.
CHID: He didn't.
MOTHER: He did.
CHILD: Look he given one to – two to Hester, and two to us.
MOTHER: Yes, that's right.
CHILD: Why did he give?
MOTHER: 'Cos there were six sweets. That's two each.

(P. Fletcher, 1985, p. 91.)

By 3, it is plain that children have learned many aspects of conversational strategy. They are able to initiate a dialogue – the various ways of obtaining and holding a listener's attention. They can handle several of the conventions of turn-taking. They know a great deal about how to respond appropriately – for example, by providing clarification when requested to do so.

These skills develop greatly between 3 and 5. In particular, there is a major development in child awareness of the social factors that govern a successful conversation – such as the correct use of forms of address and markers of politeness (e.g. *please, sorry*), and how to make requests in an indirect way. They also learn to anticipate points of potential breakdown (carry out conversational 'repairs', p. 116), such as by repeating utterances that are unclear, or asking for clarification. In particular, they develop their ability to cope with situations where they do not have things all their own way. In one study of two 4-year-old children playing together, there were 576 sequences in which one child (*A*) requested the other (*B*) to perform an action; in 122 cases, *B* refused to comply. It was therefore necessary for *A* to adopt various persuasive tactics in order to gain compliance:

A: Say yes.
B: No.
A: I'll be your best friend if you say yes.
... ...
A: Change lunch boxes.
B: No.
A: You'll have a bigger one, so you will.

(M. McTear, 1985, p. 109.)

Some of these exchanges can be very lengthy. In the same study, *A*'s request for a pair of scissors was continued for over 60 turns before it was (reluctantly) complied with.

Studies of young children's conversations show that many adult interaction skills are already present well before school-age. There is still a great deal to learn, of course – for example, 5-year-olds do not make much use of such 'manipulating' devices as *you know* or *actually*, and they must learn the strategies associated with the more formal interactions that are part of educational learning and discussion (§44). But all of this will build on a foundation of conversational ability that in many children is already extremely sophisticated by the fifth year.

TALKING BACKWARDS

From around age 7, children develop a large creative repertoire of interactive linguistic skills, as they learn to tell jokes and riddles, insult each other, maintain group identity, and make up language games (p. 59). One of the most remarkable of these abilities is talking backwards.

A study of two 9-year-olds who were able to talk backwards showed two quite distinct styles. One child (*A*) reversed the sounds of each word and ignored the spelling. The second (*B*) reversed the spellings, sounding the letters out. The pronunciations which resulted were very different. *Size*, for example, would come out as [zaɪs], using *A*'s method, but would come out as [ezɪs] using *B*'s. Here is a selection of their reversed words:

	A	*B*
nine	naɪn	'enɪn
guy	aɪg	jag
boil	lɔɪb	ljab
mouse	saʊm	'ɛsuam
continue	ujə'nɪtnak	'utənɪk
bomb	mab	bəmab
castle	lə'sæk	'ɛltsæk
axe	skæ	ksæ
bone	nob	'enab
auto	o'ta	'otuwa
inhale	lɛ'nɪ	ɛlə'næ
elevate	'tevəlɛ	ˌɛtæ'lɛvet

The sentence 'Please present an idea to the class' was translated by *B* as: [ɛsɛlp tənɛ'zɛp næʔəedə ʔʌt ʔɛt ʔɛ'sɛlk]. The words are not always perfectly accurate reversals; but there is clearly a system of rules governing their production.

Once someone learns to talk backwards, the ability seems to stay. Interviews with 27 adults who had been backward talkers as children showed that the ability was still present. Some were only able to do it slowly, or on short words, but three retained an impressive facility, reversing not only the order of sounds in words, but the order of words in sentences as well – and often at speeds very similar to those found in forwards speech! (After N. Cowan & L. Leavitt, 1982, pp 491, ff.)

TWINS

The language learning environment of twins is unique. During their early years, their linguistic experience differs greatly from that of single children. Singletons receive most of their language stimulation from adults or older children, whose utterances provide a more advanced learning 'target'. Twins, however, spend a great deal of time together, with each learning from a linguistic setting in which the other speaker is at the same developmental linguistic level. In such circumstances, it is hardly surprising to find many twins developing a private form of communication.

One study found a great deal of private language play in early-morning twin conversations. At 33 months, for example, there were dialogues in which each child responded to features of pronunciation it noticed in the other:

A: zæki su
B: (*laughing*) zæki su zæki (*both laugh*) æ:
A: api:
B: olp olt olt
A: opi: opi:
B: api: api: (*laughing*) api api api
A: ai ju
B: (*laughing*) ai ju api (*repeated several times*)
A: kaki (*repeated several times*)
B: ai i: o:
A: ai i: o o:

(E. O. Keenan, 1974, p. 171.)

To the outsider, this kind of dialogue might resemble a 'secret language', but it is no more than a form of phonetic play.

One of the most interesting features of twin language is the way in which they 'share' the response to an adult utterance:

MOTHER: What can you see in the picture?
TWIN A: A cat.
TWIN B: And a dog.

Observers have been struck by the intuitive way in which one twin is able to respond very rapidly to what the other has just said, and how the first twin is able to anticipate when to stop. They very seldom talk at the same time. Even very short utterances can be split in two:

MOTHER: What do you want me to read?
TWIN A: Puss.
TWIN B: In boots.

This kind of skill can only come from the frequent opportunities the twins have had to interact, in the early years. They know each other's rhythms, and each is able to predict a great deal of what the other is likely to say.

Perhaps because of this close dependence, twins are usually somewhat late in developing their individual language skills. When their language is formally assessed, during the third and fourth years, it is often found to be about 6 months behind the norm for singletons. On the other hand, there are certain aspects of their development that may be ahead of other children – notably, their ability to keep a conversation going, and to interact with adults. By age 7 or 8, the delay seems to have disappeared.

POTO AND CABENGA

GRACE: Cabenga, padem manibadu peeta.
VIRGINIA: Doan nee bada tengkmatt, Poto.

Reported extracts of this kind from a twin conversation achieved world-wide publicity in the late 1970s. They came from the Kennedy twins of San Diego, California, who at the age of 8 were still using their own private language. They called themselves by different names in this language: Grace became 'Poto' and Virginia became 'Cabenga' – names which were later used as the title of a film about their early years.

Their totally unintelligible speech for a while promoted the impression that the children were mentally retarded, but this proved not to be so. In due course, a detailed study of their language came to be made. This indicated that their speech was not as alien as its bizarre sound had led people to believe. It was basically a severely distorted form of English, with some features of German, several idiosyncratic grammatical characteristics, and a proportion of invented vocabulary. What made it so difficult to follow (and also to analyse!) was its extremely rapid speed of articulation and its staccato rhythm – features that later transferred to their English, when therapists began to work with them.

There are probably special reasons for the late retention of private speech in this case. The children, it seems, had very little opportunity to hear good models of English speech in their early years. They saw few other children in the area where they lived. Their parents were both working, and during the day they were cared for by their German grandmother who spoke no English. There was also an expectation that they might be retarded (because of a history of convulsions), which affected the style of the parents' interaction. Left to themselves, the twins would have had little alternative but to develop their own medium of communication.

SECRET LANGUAGES

Twins have often been observed to talk to each other in a way that is unintelligible to adults or other children. The phenomenon has been variously labelled 'cryptophasia', 'idioglossia', or 'autonomous speech'. Estimates of incidence are uncertain, but some have suggested that as many as 40% of twin pairs develop some form of private speech, especially in the second year.

There seems to be no basis for the view that a completely different 'language' is involved. The patterns heard can largely be explained with reference to the children's efforts to cope with the kind of language used around them, and to the kind of processes that take place in normal language acquisition. The twin situation promotes the continued use of immature and idiosyncratic patterns of sound, grammar, and vocabulary, and a personal style of interaction often characterized by abnormal intonation and rhythm. These patterns become particularly noticeable when the children continue to use them past the normal period of 'baby talk'. In the most dramatic cases, private speech has lasted until age 5 or more, when it often attracts a great deal of publicity.

APHASIA

When an area of the brain involved in language processing is damaged (p. 263), the language disorder that results is known as *aphasia* or (especially in Britain) *dysphasia*. This terminological choice arises from a literal interpretation of the two prefixes: *a-phasia* suggests a 'total' lack of language; *dys-phasia* implies a 'partial' lack. However, the distinction has no clinical significance: all aphasic people have some residual language ability, even if this is only a minimal level of comprehension. It therefore makes no difference which prefix is used (as long as usage is consistent): we are dealing with a continuum of disability from very mild to very severe. The *a*-prefix is now more widespread, especially in the USA, and it has come to be used in the name of the research field, *aphasiology*.

A more important question relates to the nature of the behaviour affected. Aphasia is usually defined as a handicap of *language* comprehension and/or production caused by *specific* brain damage. It therefore clearly excludes language handicaps associated with other conditions, such as peripheral deafness (where there is no brain damage, p. 268) or senile dementia (where there is a more general deterioration of mental faculties). But it is more difficult to exclude handicaps that involve other aspects of symbolic expression and the associated cognitive skills – as when aphasic people display problems with understanding gestures, the symbolism of colours (as in traffic lights), performing arithmetical operations, remembering, or paying attention. Should these difficulties be considered as part of the disorder or separate from it? The focus of aphasic handicap is undoubtedly on problems of expression and comprehension in grammar and semantics, whether in speaking, listening, reading, writing, or signing; but these problems relate closely to difficulties of a pragmatic, cognitive, or perceptual kind, and a sharp boundary line cannot always be drawn.

CAUSES OF APHASIA

The brain is totally dependent on the oxygen conveyed by its blood supply; brain cells will die if deprived of oxygen for more than a few minutes. There are many *cerebro-vascular accidents* (CVAs, commonly known as 'strokes') that can cause this to happen, and these account for about 85% of all cases of aphasia. In adult western people, arteries can become 'furred up' with fatty cholesterol deposits, associated with such factors as smoking, diet, and lack of exercise: the deposits cause narrowing and obstruction of the arteries, and this may cause a stroke. Another possibility is for the arteries to become blocked by foreign matter that has entered the blood stream. Or they may haemorrhage in various ways. Whatever the reason, if these events take place in the areas of the brain that deal with language processes (something that happens in about a third of all strokes), the result is likely to be aphasia. The other causes of aphasia include certain kinds of cerebral tumour, brain disease, and traumatic damage (head injuries due to traffic accidents, falls, acts of violence, etc.). About a quarter of all penetrating head injuries lead to aphasia. Altogether, the annual incidence of the handicap is about 0.6% of the population (1 in 200), with males more at risk.

About a quarter of all patients recover within three months. The rate of recovery then decreases, with full recovery increasingly unlikely after six months. A further 25% of patients are still severely affected after a year, with little subsequent improvement expected. The different communication modalities usually recover at different rates: generally, comprehension improves more rapidly than production. However, the process of recovery is little understood. It may be that cells close by the damaged area regain some of their function after a while, or perhaps other parts of the brain (such as the right hemisphere) may come to be used.

Samuel Johnson

Walter Scott

THE EFFECTS OF APHASIA

Samuel Johnson

From a letter written on 19 June 1783 three days after a stroke robbed him of speech:

I went to bed, and in a short time waked and sate up as has long been my custom, when I felt a confusion and indistinctness in my head which lasted, I supposed about half a minute: I was alarmed and prayed God, that however he might afflict my body, he would spare my understanding. This prayer, that I might try the integrity of my faculties I made in Latin verse. The lines were not very good, but I know them not to be very good. I made them easily, and concluded myself to be unimpaired in my faculties.

Soon after, I perceived that I had suffered a paralytick stroke, and that my Speech was taken from me. I had no pain and so little dejection in that dreadful state that I wondered at my own apathy...

In order to rouse the vocal organs I took two drams. Wine has been celebrated for the production of eloquence; I put myself into violent motion, and, I think, repeated it. But all was vain...

Walter Scott

From his diary, 5 January 1826:

Much alarmed. I had walked till 12 with Skene and Colonel Russell, and then sat down to my work. To my horror and surprise I could neither write not spell, but put down one word for another, and wrote nonsense. I was much overpower'd at the same time and could not conceive the reason. On waking my head was clearer... (W. E. K. Anderson, 1972, p. 55.)

(22 April 1830)

Anne would tell you of an awkward sort of fit I had on Monday last; it lasted about five minutes, during which I lost the power of articulation, or rather of speaking what I wished to say. I revived but submitted to be bled.

(S. G. Lockhart, 1900, p. 262.)

A more recent account

In 1960, Douglas Ritchie wrote a diary of his recovery from stroke. One year after the stroke he felt like this:

My speech? I might have had two or three stray words but I could not tell. In the Centre I rarely spoke to anyone. I had nothing to say and I was embarrassed because I could not say anything. I read all the spare time I had. In the ambulance, where I used to spend upwards of two hours daily with four and five people week after week and where I was less embarrassed, I used sometimes to try different words. One week I was optimistic and the next there was nothing...

My writing was more depressing. I had only written 'Good luck, Clif' or a message like 'cigarretes' (spelt wrong – this might have aroused my suspicions, but it did not), and for the rest made the excuse that I did not write with my left hand. But it was my mother's birthday in May and I felt that I should write her a letter. I no sooner had the paper in front of me when every single word galloped out of sight. I was left staring at the blank sheet. Nearly half an hour passed; panic grew; this was nothing to do with my left hand. At length my wife came in and she dictated slowly, letter by letter, 'many happy returns...'. I managed to forget my panic for a time.

(D. Ritchie, 1960, pp. 96–7.)

TYPES OF APHASIA

There have been many different classifications of aphasia, reflecting the difficulty aphasiologists find in grouping patients together so that their medical and their behavioural symptoms coincide. A classification based on the site of the lesion(s) will make neurological sense, but may not result in a neat description in linguistic or psychological terms. Correspondingly, a behavioural classification usually cuts across some of the traditionally recognized neurological distinctions. There also may be some change in the aphasic symptoms, as the recovery period progresses. A few major categories have sufficient homogeneity, both medically and behaviourally, to stand the test of time, and these continue to be cited as 'classical' aphasic syndromes. These patients, however, may well be outnumbered by the many cases where the aphasic symptoms are 'mixed', to some degree, and where a classical diagnosis is unclear.

Broca's aphasia The lesion is classically located in and around Broca's area, typically extending some way back along the Sylvian fissure (p. 262). The nature of the symptoms has led to its also being called *expressive* or *motor* aphasia. The language is usually characterized as markedly non-fluent – slow, laboured, hesitant, often one syllable at a time, with great difficulty in articulation, and disturbed suprasegmental features (§29). Sentences are short and reduced to a 'telegrammatic' style, with little use of the normal processes of grammatical construction (§16). Individual words are often repeated. Comprehension of everyday language is near-normal.

Wernicke's aphasia The lesion is classically located in Wernicke's area (p. 262), though there is some variability. The nature of the symptoms has led to its also being called *receptive* or *sensory* aphasia. The language is characterized as fluent, often excessively so, with no articulatory difficulty, though there may be several erratic pauses. There is usually a severe disturbance of comprehension, though this is obscured by a normal intonation. The speech illustrates many stereotyped patterns, circumlocutions, unintelligible sequences (known as 'jargon'), errors in choosing words and phonemes (§28), and problems in retrieving words from memory.

Global aphasia The symptoms are those of severe Broca's and Wernicke's aphasia combined. There is an almost total reduction of all aspects of spoken and written language. The patient's expressive abilities are minimal, and in most cases do not much improve over time. Comprehension of spoken language, initially very poor, shows limited recovery. The disorder is sometimes known as 'irreversible aphasia syndrome'.

EXPRESSIVE APHASIA

Several of the symptoms of Broca's aphasia can be seen from this French patient's description of the evolution of his disease (abnormal drops in pitch are marked by /):

Euh, hémiplégie, euh, fulgurant, euh, Hôpital Pasteur, Nice, Nice. Euh, Docteur Dupont. Euh, euh, examens/ enfin, examen, euh, enfin, un coma euh, un petit peu. Euh, un mois/ un mois, euh, pavillon F-3 /dy/ euh, Docteur Durand. Les reins. Euh, kinésithérapeute. Marche euh, euh, très bien, enfin, un peu, un peu.Euh, premier novembre, médica/ Le/ Giscard/ Docteur Giscard euh, rééducation. Euh, euh, oui, euh, kiné/ non, huit heures, kiné, euh, un quart d'heure ...
(Uh, hemiplegia, uh, fulgurant, uh Pasteur Hospital, Nice, Nice. Uh, Doctor Dupont, uh, uh, examinations/ finally, examinations, uh, finally, a coma uh, a little bit. Uh, a month/ a month, uh, pavillion F-3 /dy/ uh, Doctor Durand. My kidneys. Uh, physiotherapist. Walk uh, uh, very well, a little, a little. Uh, November first, medica/ The/ Giscard/ Doctor Giscard uh, therapy. Uh, uh, yes, uh physio/ no, eight o'clock, physio, uh a quarter of an hour...)
(A. R. Lecours *et al.* 1983, p. 86)

RECEPTIVE APHASIA

Several of the symptoms of Wernicke's aphasia can be seen in this French patient's response to a question about his family (strong stresses are italicized):

Oui, j'ai une autre *femme* qui est restée depuis la /bœtʀe/ de l'enfant de *ma fils. Il a*/ elle avait dix ans quand mon /fɛs/est mort. Et alors, elle est là maintenant. Elle va sur /syz/ ans. Elle va toujours à l'école, puisqu'elle se présente les/ Je l'avais envoyée à l'école puisque, moi, je travallais bien dans les /syz/ / – euh – à la /faʀmid/ de/ de/ de /syz/, n'est-ce pas, de deux /ɛtmiʀ/. Et alors, je/ Cette /mwazɛ/ – la – euh, *Ginette*, elle s'appelle – elle/ elle /abil/...
(Yes I have another *woman* who has remained since the /bœtʀe/ of the child of *my son. He* is/ she was ten years old when my /fɛs/ died. And then, she is there now. She will soon be /syz/ years old. She is still going to school since she presents herself the/ I had sent her to school since I myself was indeed working in the /syz/ / – uh – at the /faʀmid/ of/ of /syz/ isn't it, of two /ɛtmiʀ/. And then, I/ This /mwazɛ/ – there uh, *Ginette* is her name – she/ she /abil/...)
(A. R. Lecours *et al.*, 1983, p. 94.)

OTHER SYMPTOMS

Aphasia is often accompanied by other symptoms which need to be taken into account when assessing the communication impairment as a whole.

- *Agnosia:* a difficulty in recognizing familiar sensory stimuli. When the disability relates to sounds, it is known as *auditory* agnosia; when it relates to pictures or shapes, it is known as *visual* agnosia.
- *Apraxia* (or *dyspraxia*): an often severe difficulty in controlling voluntary movements of limbs or vocal organs. In particular, there may be an inability to control sequences of sounds (*articulatory* or *verbal* apraxia) or gestures. The intention to communicate is present, but the patient cannot carry it out.
- *Anarthria* (or *dysarthria*): there is often an accompanying weakness or paralysis in the side of the body opposite the hemisphere which has been damaged (p. 260). When this affects the face or neck, the functioning of the vocal organs can be impaired, to produce a poorer quality of articulation. The effects range from mild to severe – from a slight slurring to total unintelligibility.

A group enjoying the atmosphere of a stroke club – one of many voluntary groups that have been set up to aid the process of rehabilitation in people who are impaired by the range of handicaps that follow a stroke – notably paralysis and aphasia.

DYSLEXIA AND DYSGRAPHIA

The onset of brain damage in adult life frequently leads to a disorder of reading or writing in people who have previously been literate. The handicap is usually accompanied by aphasic symptoms affecting spoken language (p. 272); occasionally, it is the only, or predominant, symptom. In all cases, the reading disorder is referred to as (*acquired*) *dyslexia* and the writing disorder as (*acquired*) *dysgraphia*. The *a-* prefix is also used, especially in Europe and North America (*alexia, agraphia*). The label 'acquired' distinguishes the handicap from the more widely known *developmental* kinds of dyslexia and dysgraphia that occur in young children where there is no evidence of any brain damage (see p. 275).

Neuropsychological studies of these handicaps have generally proceeded by classifying patients into types, based on a detailed description of the kinds of errors made. The process is a slow and difficult one, partly because of the large amounts of vocabulary that have to be analysed before an error pattern emerges, and partly because there are usually associated language symptoms that also need to be taken into account. Nonetheless, since the 1970s several types of acquired dyslexia and dysgraphia have been proposed, based on a small number of case studies.

TYPES OF ACQUIRED DYSLEXIA

Phonological dyslexia People with this problem are unable to read on the basis of the 'phonic' rules that relate graphemes to phonemes (§34). This means that they can manage to read familiar words, but they have great difficulty with new words (such as technical terms) or with simple nonsense words (such as *lak*).

Deep dyslexia Here too people are unable to read new or nonsense words, but in addition they make many semantic errors (e.g. reading *forest* as 'trees'). There are also several other types of difficulty, including visual errors (e.g. reading *signal* as 'single'), and errors that combine visual and semantic properties (e.g. reading *sympathy* as 'orchestra', presumably because of the link via *symphony*). Words with concrete (as opposed to abstract) meanings are easier to read. The table (right) gives further examples of this unusual syndrome.

Surface dyslexia People with this problem are very poor at recognizing words as wholes, and rely greatly on a process of 'sounding out' the possible relationship between graphemes and phonemes. Irregular words (such as *yacht*) pose particular difficulty. A wrongly pronounced word will be given a meaning on the basis of how it sounds, not how it looks (e.g. one person read *begin* as 'beggin', then added 'collecting money'). There is a problem with homophones (see Glossary, Appendix I) (e.g. one person understood *bury* as 'a kind of hat').

Several other types have been proposed. There is, for example, a visually based dyslexia, in which people fail to read the parts of a word correctly (e.g. one patient read 'night' when shown *near* + *light*), or confuse words of similar appearance (as when *met* was misread by one patient as 'meat', and *rib* as 'ride'). In such cases, the patient can often name the letters of the word correctly, but remains unable to identify the whole word. There are also several disorders of a neurologically more 'peripheral' kind, such as letter-by-letter reading, in which patients find it necessary to name all the letters of a word (aloud or subvocally) before they can identify it.

The search for 'pure' types of dyslexia is complicated by the occurrence of individual differences between patients, and by the existence of cases where symptoms are 'mixed'. Problems of interpretation are therefore considerable. Are deep dyslexic errors due to a partial impairment of the left hemisphere alone, or is the right hemisphere involved in some way? And, within the first of these possibilities, is the disorder the result of an impaired semantic system, or is that system intact, with the problems arising out of an impaired ability to make correspondences between graphemes and phonemes? Answers to such questions will only emerge once the database is enlarged by in-depth linguistic descriptions of many more cases.

TYPES OF ACQUIRED DYSGRAPHIA

Most work in this field has studied the disruption caused to spelling ability (p. 215). Three syndromes have been proposed, analogous to those proposed for acquired dyslexia.

Phonological dysgraphia People with this problem can spell real words but not nonsense words (though they can sometimes read many of them, and speak them aloud).

Deep dysgraphia Here too there is no ability to spell on a phonetic basis; if someone is asked to write a dictated nonsense word, for example, it is often replaced by a real word that is similar in sound (e.g. *blom* is written *flower*, presumably because of the word *bloom*). Errors seem to be semantically related (e.g. one person, asked to write *bun*, wrote *cake*). The spelling of words with concrete meaning is better than that of words with abstract meaning. The relationship to reading ability is unclear: one patient studied had normal reading ability, but most seem to have some deep dyslexic symptoms also.

Surface dysgraphia People with this problem can spell spoken nonsense words in a plausible way, but cannot spell irregular real words (e.g. one person wrote *biscuit* as *bisket*) – and even regular words may be affected. They seem dependent on using grapheme–phoneme conversion rules; whole-word spelling is impaired, though not entirely lost (e.g. one person spelled *yacht* as *yhagt*, showing some visual recall).

DEEP DYSLEXIA SYMPTOMS

The first patient providing evidence of a deep dyslexia syndrome was studied by a Medical Research Council team in Oxford in the 1960s – a person who had been a highly literate adult before his left-hemisphere injury. His reading errors were classified into five types (in each case the target word is on the left and the patient's version is on the right).

Semantic errors
act → play
close → shut
dinner → food
afternoon → tonight

Derivational errors (p. 90)
wise → wisdom
strange → stranger
pray → prayers
birth → born

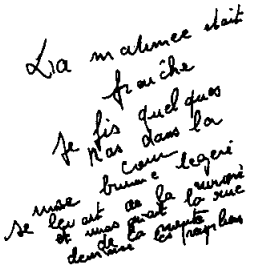
Visual errors
stock → shock
quiz → queue
crocus → crocodile
saucer → sausage

Function words (p. 91)
for → and
his → she
the → yes
in → those

Non-words
wux → ('don't know')
wep → wet
dup → damp
nol → ('no idea')
(J. C. Marshall & F. Newcombe, 1980, pp. 1–3.)

SPATIAL DYSGRAPHIA

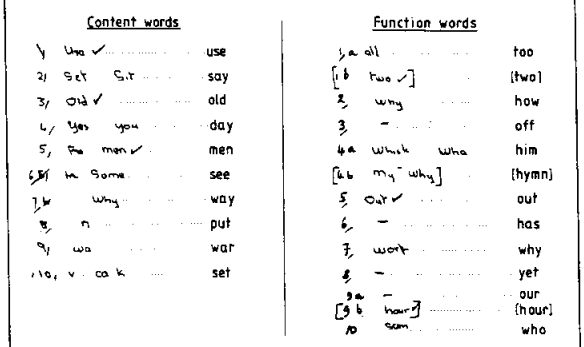
This patient had an operation to remove a tumour from the parietal lobe of the right hemisphere (p. 260). One of the symptoms that resulted was a spatial dysgraphia that is clearly seen in the patient's writing abilities. The left-hand side of the page is neglected; the lines are at an angle; some letters are spaced abnormally; and there are several unnecessary repetitions of letter strokes and letters. (From H. Hécaen & P. Marcie, 1974, p. 359.)



DEEP DYSGRAPHIC ERRORS

Responses of one deep dysgraphic patient to part of a single-word dictation test.

Function words are particularly poor: some are not attempted; some bear little resemblance to the stimulus word. In three cases, he added content word homophones (1b, 4b, 9b), and was able to spell two of them. The content word list shows several visual errors (e.g. *why* for *way*), but none of the semantic errors that were also a feature of this person's handicap (e.g. writing *small* for *little*). (From F. M. Hatfield & K. E. Patterson, 1984, p. 189.)



STRING INSIDE MY HEAD

It was easy to talk about what I had seen in the park, or to sort out the ballet shoes, or to put books away neatly according to size, but to decipher the alphabet, or recognize C.A.T. and say what it spelt was almost impossible... When I was required to write, a strange feeling came over me, and I felt there was a long piece of string in my head.

My mother would say, 'C.A.T. spells cat. Susan, what does C.A.T. spell?

'I don't know, I don't know, Mrs Hampshire (as I called her at school), I don't know what it spells.'

The string inside my head stopped me from answering. It actually felt as though my skull housed a whole ball of string, with an end sticking out of my crown. I thought that if I pulled at this, I could get the string out, empty my head of it, unravel the tangle in my brain...

'Mummy, I can feel my string.'

'Don't be ridiculous, Susan.'

The page, the pencil, my mother's face, her slightly oily skin – not a line on it – her dark brown eyes compelling me to answer correctly, her nail polish half erased by the washing-up, all this I could see and remember– but I could not remember C.A.T. Probably the most difficult word in the world, C.A.T. If only the other children couldn't spell C.A.T.

'Stop looking in the mirror and think about how you spell cat.'

I couldn't. I just could not. I tried, but I couldn't. My head was empty – except for the string.

(From *Susan's Story* (1981, pp. 26–7), the autobiography of Susan Hampshire.)

Acquired dysgraphic patients are usually also dyslexic to some degree. Moreover, classification must allow for cases where there are specific motor or sensory impairments. For example, there are people who can speak, read, spell aloud, and type, yet who cannot produce the letter shapes or movements required for writing by hand. Letters are badly formed, misplaced, repeated, or omitted. In such cases, it is graphetic rather than graphological ability that is affected (p. 187).

DEVELOPMENTAL DYSLEXIA

Since the early years of this century, it has come to be widely recognized that there are children who, after a few years at school, are consistently seen to fail at the tasks of reading, writing, and spelling, despite normal intelligence, instruction, and opportunity to learn. No medical, cultural, or emotional reason is available to explain the discrepancy between their general intellectual and linguistic abilities and their level of achievement in handling written language. There is often a history of early language delay, but by age 9 or so, spoken language ability is apparently normal, whereas written language skills may remain at the level of a 5- or 6-year-old.

These are the children who have been called 'dyslexic', though alternative labels have been devised for the condition in an attempt to escape the originally medical connotations of this term (notably 'specific reading disability' and 'learning disability'). In fact there are around 40 different terms used for problems in this area, some of which retain a medical bias, such as 'minimal brain dysfunction' and (in parts of Europe) 'legasthenia'. Because the handicap is viewed as a problem with 'written language' in all its forms, the term 'dyslexia' usually subsumes the kind of difficulties referred to as 'dysgraphic' in the brain-damaged adult.

The blighted school career of such children, when no-one recognizes their handicap, has been well documented. Their ability to read, whether for information or pleasure, and their daily failure in their attempts at written work, has a devastating effect upon their ability and motivation to learn. There are often associated problems in coping with number symbols (in arithmetic), and in tasks requiring short-term memory, such as following instructions. Their poor writing and spelling tends to be viewed as a symptom of educational subnormality or lack of intelligence – or, if the child is known to be intelligent, leads to a charge of laziness or 'not trying', with subsequent punishment in school and increased family tension at home. As a result, it is not surprising to find that many such children become anxious, withdrawn, or aggressive – with deteriorating behaviour in some cases leading to them being described as maladjusted. Career prospects, in such cases, are minimal.

Questions of incidence and causation are discussed on pp. 276–7, along with a more detailed illustration of the range of dyslexic symptoms.

Incidence

The dyslexia problem is becoming increasingly recognized, with many countries now setting up organizations to draw attention to the handicap and to provide special help. In a very few countries, this help is guaranteed by legislation. It is however extremely difficult to arrive at an accurate estimate of incidence because there are no internationally accepted reading tests and criteria of handicap. In one survey of 16 countries, the mean percentage of non-retarded children with reading difficulties was 8% – but this covered a range that went from 1% (China) to 33% (Venezuela). Some estimates suggest that dyslexic boys outnumber girls in a ratio of around 3:1, others that it may be as many as 10:1.

The uncertainty derives from the fact that reading difficulty is a continuum from normal to abnormal, with the only criterion of handicap being that the children's ability is well below their age and intelligence. Everything therefore depends on how intelligence and reading achievement is measured, and what is considered to be 'well' below normal. For example, if the definition of dyslexia includes only those children who are retarded by at least two years in reading ability, the numbers affected will be appreciably greater than one which requires that they be retarded by at least three years. Such differences of method, even within a single country, make it virtually impossible to arrive at an agreed statement of incidence.

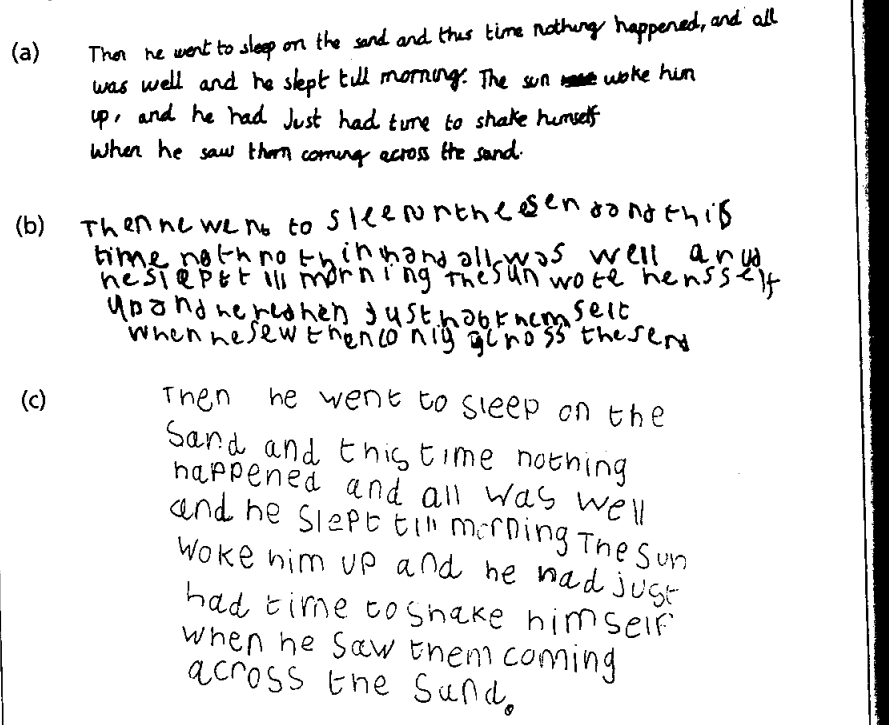
Causation

The question of causation has also promoted great controversy. Until recently, there was a widespread assumption that all dyslexics were fundamentally alike, and that a single cause of the handicap could be found. A large number of candidate 'causes' were therefore proposed, postulating any of several medical or psychological factors, such as visual perception, intersensory integration, memory, attention, eye movement, verbal processing, and hemispheric dominance (p. 260). There could be several possible approaches within any one of these headings. For example, under dominance it has been argued that dyslexia is the result of (a) a lack of dominance, (b) a lag in dominance development, (c) a specific left-hemisphere deficit, (d) right-hemisphere interference, or (e) a disintegration of functioning between the two hemispheres. The role of the left hemisphere is strongly implicated (as is suggested by associated spoken-language delays and errors, and problems of motor coordination), but its exact influence is unclear.

Recent reviews of what is now a vast experimental literature indicate that a unitary explanation for dyslexia is illusory. The modern focus on individual case studies (as opposed to the traditional use of group studies) is bringing to light the existence of a variety of dyslexic syndromes, reflecting several possible causes. A popular contemporary view is that there is a large set of

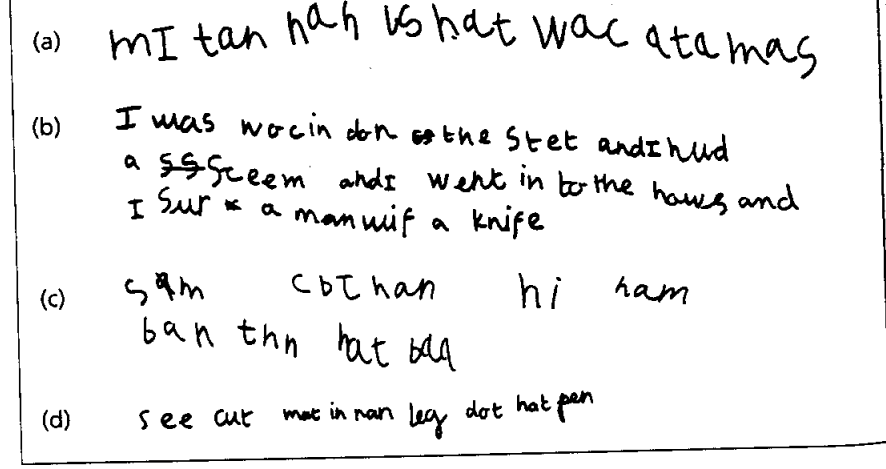
COPYING

Copying by three children, which shows some of the problems of the backward reader. The style of (b) is well behind that of (a), who is the same age, and in many respects it is not as well organized as that of the younger child (c).
(a) Normal reader, aged 9 years, 8 months.
(b) Backward reader, aged 9 years, 8 months, with a reading age of 6 years, 9 months.
(c) Normal reader, aged 6 years, 6 months, with a reading age of 6 years, 9 months. (From L. Bradley, 1983, p. 238.)



DYSLEXIC PROGRESS

(a) A sample of a dyslexic boy's free writing at 8 years of age. The sentence reads: 'My favourite hobby is art work and maths.'
(b) The same child's free writing at age 9 years, 8 months, after specialized help. The sentence reads: 'I was walking down the street and I heard a scream and I went into the house and I saw a man with a knife.'
(c) The same child's spelling at age 8. The words are: *see, cut, mat, in, ran, led, lot, hat, pen.*
(d) The same child's spelling of these words at age 9. (From M. Thomson, 1984, pp. 41–2.)



factors implicated in dyslexia, some sub-set of which turn up in individual cases. For example, in one group of children, there was clear evidence of an unstable eye dominance: the children had not established a stable 'leading' eye in their reading. Another group showed difficulties with making perceptual distinctions (e.g. distinguishing same/different letters). A further group displayed problems with short-term memory.

The main methodological problem in such research is to determine whether the weakness shown by dyslexics is the cause or the result of the handicap. For example, many of these children have faulty eye movements (shorter saccades, longer fixations, more regressions, §34), but it is an open question whether these form a constitutional problem that made it difficult for them to learn to read, or whether the poor movements began as a result of their difficulties with reading, or whether there is no functional relationship between them at all. If information is not available on what the children were like before they began to read, and on how they perform with non-reading tasks, it is difficult to interpret the results of such experiments.

The conflicting and ambiguous research findings, linked with ambitious claims about 'the' cause of dyslexia, have led to a great deal of scepticism about the condition, especially when the possibility of an underlying medical cause is being stressed. These doubts are slowly being resolved, but there is still a need for new research initiatives – in particular, devising individual development profiles, along the lines of the acquired dyslexia research, and relating findings more to the nature of reading development in normal children, in order to establish what counts as an 'abnormal' error. In such ways, it will be possible to devise better developmental classifications based on behavioural symptoms.

Acquired vs developmental?

The several similarities between the symptoms presented by the two kinds of dyslexia have led some scholars to argue that there is an underlying identity. Parallels have been proposed between developmental dyslexics and acquired deep dyslexics (p. 274) – for example, both groups have trouble in reading nonsense words, and are better at reading concrete words. However, so far there is little clear evidence that children display the kinds of semantic error that are crucial to the identity of the deep dyslexia syndrome. Similarly, there have been proposals that developmental dyslexia displays a parallel with acquired surface dyslexia (e.g. because of similarities in phonic reading ability) and with phonological dyslexia (e.g. because of similarities in direct visual word recognition). None of these positions has yet produced a substantial child database, however, and several differences between the adult and child populations remain – in particular, the greater variability of children's performance. There is, moreover, always the possibility that the brain mechanisms that underlie reading acquisition are different from those used to maintain reading skills in later life. The unity view thus provides us with a set of intriguing but at present largely speculative hypotheses.

COMMON FEATURES OF DYSLEXIA

A wide range of factors has been implicated in the search for a definition of dyslexia. The following features commonly recur, but it must be stressed that there is great variation between dyslexic children (and, of course, between those whose symptoms have continued into adult life). Probably no dyslexic child would display *all* of these features, but most display several.

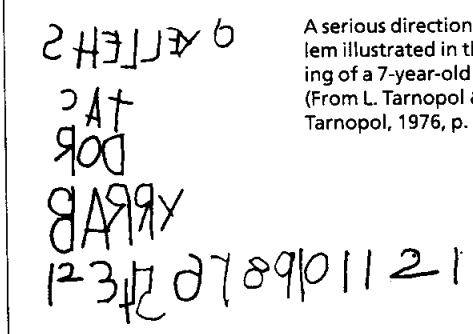
Background features
- Sight normal.
- Hearing normal.
- IQ near-average or above.
- Health normal.
- Adequate first teaching.
- No previous emotional disturbance.
- No gross brain damage.
- No socio-cultural deprivation.
- No serious lack of schooling.

Psycholinguistic features
- Reading, spelling, and writing all below that expected for age and IQ.
- Persistent and often bizarre reading and spelling errors, e.g. letters reversed or out of order (confusion of *b/d, was/saw*, etc.).
- Confusion when labelling left and right, and generally poor directional ability.
- Difficulties in coding symbols and sounds, e.g. naming letters of the alphabet.
- Difficulties in sequencing, e.g. putting things in a series, remembering days of the week, keeping one's place.
- Poor short-term memory, e.g. remembering tables or instructions.
- A history of late language development.
- Some pronunciation difficulty, especially with long words.
- Non-fluency in speech.
- Poor auditory discrimination of speech sounds.
- Problems of visual perception.
- A history of motor clumsiness.
- Problems of finger differentiation.
- Mixed handedness or confused laterality.
- Poor concept of self.
- Sometimes good spatial skills, e.g. model making.

HYPERLEXIA

Reading-retarded children sometimes develop a surprising ability to read aloud – including the accurate production of quite advanced vocabulary, well beyond their level of comprehension. In one study, this remarkable skill was observed in a 7-year-old boy with an IQ of only 77, and a level of motor development equivalent to a 3½-year-old. He had learned nursery rhymes and television commercials as early as age 2, and learned to read soon after 4 with little help from his parents. By the time he was 5 years old, he was fluently reading aloud material that would be appropriate for a normal 10-year-old.

The ability such children have to read aloud goes well beyond their other cognitive abilities. They have great difficulty, for example, associating the words they read with objects or pictures. On the other hand, they have great facility in sounding out nonsense words. (After P. R. Huttenlocher & J. Huttenlocher, 1973.)



A serious directional problem illustrated in the writing of a 7-year-old girl. (From L. Tarnopol & M. Tarnopol, 1976, p. 283.)