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## The voices within: The power of talking to yourself

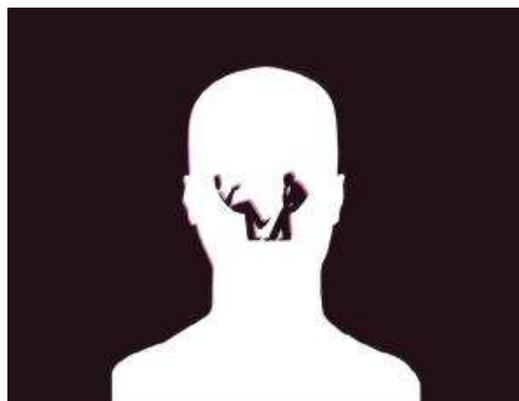
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*Our inner speech turns out to shape our thoughts and decisions in more ways than you might have imagined*

IT CAN happen anywhere. I can be driving, walking by the river or sitting quietly in front of a blank screen. Sometimes suddenly, sometimes gradually and imperceptibly, I become conscious of words that no one else can hear, telling me things, guiding me, evaluating my actions. I am doing something perfectly ordinary – I am *thinking* – and it takes the form of a voice in my head.



Life in the chatter box (Image: Daniel Stolle)

If you ask people to reflect on their own stream of consciousness, they often describe experiences like this. Usually termed inner speech, it is also referred to as the inner voice, internal monologue or dialogue, or verbal thought. But although philosophers have long been interested in the relationship between language and thought, many believed that inner speech lay outside the realms of science. That is now changing, with new experimental designs for encouraging it, interfering with it and neuroimaging it. We are beginning to understand how the experience is created in the brain; its subjective qualities – essentially, what the words "sound" like; and its role in processes such as self-control and self-awareness. The voice in our head is finally revealing its secrets, and it is just as powerful as you might have imagined.

Much of modern research has been inspired by the long-neglected theories of [L. S. Vygotsky](#), a Russian psychologist whose career unfolded in the early days of the Soviet Union. Vygotsky only studied psychology for about 10 years before his untimely death from tuberculosis in his late thirties – a fact that has led some to call him "the Mozart of psychology". Starting with observations of children talking to themselves while playing, Vygotsky hypothesised that this "private speech" develops out of social dialogue with parents and caregivers. Over time, these private mutterings become further internalised to form inner speech.

If Vygotsky was right, inner speech should have some very special properties. Because it develops from social interactions, it should take on some of the qualities of a dialogue, an exchange between different points of view. Vygotsky also proposed that inner speech undergoes some important transformations as it becomes internalised, such as becoming abbreviated or condensed relative to external speech. For instance, when hearing a loud metallic sound outside at night and realising that the cat is to blame, you probably wouldn't say to yourself, "The cat has knocked the dustbin over." Instead, you might just say, "The cat," since that utterance contains all the information you need to express to yourself.

Partly because Vygotsky's work was suppressed by the Soviet authorities, it was a long time before his ideas became well known in the West, and even longer before researchers tested whether people actually report these qualities in their inner speech. In the first such study, conducted in 2011 at Durham University, UK, my colleague Simon McCarthy-Jones and I found that 60 per cent of people report that their inner speech has the to-and-fro quality of a conversation.

### Eavesdropping on thoughts

So-called "self-report" methods have their limitations, not least that people are being asked to

comment retrospectively on their inner experience. Another method, offering a richer picture of people's thoughts during a particular time period, was developed by psychologist [Russell Hurlburt](#) at the University of Nevada, Las Vegas. It involves participants being trained to give very detailed descriptions of their own inner experience in response to random cues from a beeper. Such studies have shown that people often report a train of thought unfolding more quickly than circumstances ought to have allowed, and yet not seeming rushed, which could be taken as evidence for the compression of sentences that Vygotsky postulated.

Vygotsky's theory also suggests some possibilities about the way inner speech is created in the brain. If it is derived from external speech, as he proposed, both might be expected to activate the same neural networks. Sure enough, long after his death, fMRI studies have linked inner speech to the left inferior frontal gyrus, including a region called Broca's area, which is known to be important for speech production.

Quite how much our inner and outer speech overlap remains a matter of debate. According to one view, inner speech is just external speech without articulation: the brain plans an utterance, but stops short of kicking our muscles into action. If that is the case, our internal voice should resonate with the same qualities of tone, timbre and accent as our ordinary external speech.

There are some hints that this may be the case. In their lab at the University of Nottingham, UK, psychologists Ruth Filik and Emma Barber recently [asked participants to read limericks](#) silently in their heads. One was: *There was a young runner from Bath, Who stumbled and fell on the path; She didn't get picked, As the coach was quite strict, So he gave the position to Kath.*

The other limerick read: *There was an old lady from Bath, Who waved to her son down the path; He opened the gates, And bumped into his mates, Who were Gerry, and Simon, and Garth.*

Importantly, some of the participants had northern English accents, with short vowels (pronouncing "Bath" to rhyme with "Kath"), while the others had the long vowels of a southern accent ("Bath" rhyming with "Garth"). By tracking the volunteers' eye-movements, the researchers showed that reading was disrupted when the final word of the limerick did not rhyme in that volunteer's accent – when a southerner read "Bath" then "Kath", for instance. Although this study suggests that inner speech does indeed have an accent – and presumably other qualities of our spoken voice – one concern is that the inner speech we produce when reading is not necessarily the same thing as our everyday, spontaneous inner speech, which means that more naturalistic studies are needed.

So much for the subjective qualities of inner speech. What, if anything, does it actually do? Vygotsky proposed that words in inner speech function as psychological tools that transform the task in question, just as the use of a screwdriver transforms the task of assembling a shed. Putting our thoughts into words gives them a more tangible form which makes them easier to use. It may also be that verbal thought can allow communication between other cognitive systems, effectively providing a common language for the brain.

One of Vygotsky's most enticing predictions was that private and inner speech give us a way of taking control of our own behaviour, by using words to direct our actions. While driving up to a roundabout in busy traffic, for example, I'll still tell myself, "Give way to the right", especially if I've just been driving overseas. Knocking out the systems responsible for inner speech should therefore impede our performance on certain tasks that require planning and control, offering a powerful test of the hypothesis.

Such experiments typically require participants to repeat a word to themselves out loud to suppress their verbal thoughts while they perform a task (a technique known as articulatory suppression). Using this set-up, Jane Lidstone, one of my colleagues at Durham University, looked at the performance of children aged 7 to 10 on a planning task known as the Tower of London, which involves moving coloured balls around between three sticks of differing lengths in order to match a given pattern. Lidstone found that children performed worse if [they had to repeat a word out loud](#), compared with trials in which they instead tapped repetitively with one of their feet. Similar findings have emerged from studies with adults. Alexa Tullett and Michael Inzlicht of the University of Toronto in Canada gave student participants a [classic test of control known as the Go/No-Go task](#), which required them to press a button the moment they saw a yellow square pop up on the screen, but to remain still when they saw a purple square. It is a considerable test of impulse control, and, as predicted, the students were [less accurate](#) during articulatory suppression, compared with when they were doing a spatial task. Although experiments like these seem artificial, they allow researchers the kind of control over conditions that good science demands to test something like self-control.

## Pep talks

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So we know that inner speech has a role in regulating behaviour, but could it also have a role in motivating it? The research on children's private speech (Vygotsky's precursor of inner speech, remember) shows that it frequently has an emotional or motivational flavour. Athletes often give themselves pep talks before, during and after performances. In our study of the quality of inner speech, McCarthy-Jones and I found that two-thirds of students reported using internal speech that either evaluated their behaviour or served to motivate it.

Inner speech may even help us to become aware of who we are as individuals. Some philosophers have proposed that awareness of inner speech is important for understanding our own mental processes, an aspect of what psychologists call metacognition. Children typically do not become aware of their own inner speech until around age 4, although it is uncertain whether that reflects their inability to reflect on their own thought processes, or the fact that inner speech is not yet fully internalised by that age. At Mount Royal University in Calgary, Canada, psychologist [Alain Morin](#) has found that people who use inner speech more often show better self-understanding. "Inner speech allows us to verbally analyse our emotions, motives, thoughts and behavioural patterns," he says. "It puts to the forefront of consciousness what would otherwise remain mostly subconscious."

While researchers are still gathering the evidence, these results certainly suggest that the voice in the head is important to many cognitive processes. But what about people who, for various reasons, don't talk to themselves in the usual way? As you might expect, deaf people who communicate in sign language often talk to themselves in sign too. People with autism, meanwhile, who often have problems with linguistic communication, seem not to use inner speech for planning, although they do use it for other purposes such as short-term memory. A more dramatic difficulty comes from damage to the language areas of the brain, which can silence some people's inner voices. One such individual, neuroanatomist [Jill Bolte Taylor](#), reported [a lack of self-awareness after a stroke](#) that damaged her language system – supporting Morin's view that verbal thinking may be important for self-understanding.

Lending an ear to the differences between people might also tell us more about the dark side of inner speech, following a growing understanding that our internal monologue is not always beneficial to our well-being. When we worry and ruminate, we often do it in words, and our inner speech may contribute to anxiety and depression by keeping thoughts in the head that would be better off discarded. Inner speech may play its biggest role, however, in an experience that is often associated with other forms of mental disorder. People with certain psychiatric diagnoses (particularly schizophrenia), but also a small minority of people who do not have a mental illness, report the experience of hearing a person speak when there is no one present. Voice-hearing, or auditory verbal hallucination, is an enigmatic phenomenon whose cognitive and neural bases are not yet well understood. One prominent theory proposes that it occurs because the individual produces an utterance in inner speech that they do not recognise as their own. The result is that a bit of speech that was actually self-generated becomes attributed to another person: an alien voice.

Various lines of evidence converge to support this view. An early observation was that people who hear voices produce very slight activation in their articulatory muscles when their voices occur. Cognitive behaviour therapy to treat voice-hearing often focuses on blocking the phonological loop, by articulatory suppression or listening to music, so that the rogue inner speech cannot be generated. But the phenomenon of voice-hearing is undoubtedly more complicated than this. McCarthy-Jones, now at Macquarie University in New South Wales, Australia, notes that "while inner speech appears to be the basis of some voices, others are actual or mutated memories of earlier life-events (often traumatic ones)". Many researchers, particularly those associated with the worldwide [hearingthevoice.org/looking-for-support](#) Hearing Voices Movement, now believe that voices have important meanings for the individual, and therefore that they need to be understood rather than suppressed.

## A shower of words

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There is much more we need to learn about inner speech's roles in our thinking and behaviour. Some insights may come from people who, without any disability, don't report any inner speech at all. For some of these people, it may be that inner speech is present, but that it is so condensed and abbreviated that it no longer seems very like language. It will also be interesting to note the consequences when people try to suppress their inner speech (and indeed all conscious thought) through varieties of meditation.

One thing we can be sure about is that inner speech takes many forms. Some will be good for explicit self-regulation and motivation; others will be closer to a kind of deep thinking with no particular sound

quality. In fact, understanding inner speech better will help us to be clearer about what we mean by the nebulous term "thinking", and in this way make progress with some long-standing philosophical problems about [how language, cognition and consciousness work together](#).

When I think about my own inner speech, I keep coming back to Vygotsky's ideas about "condensation". Sometimes I catch myself in the middle of a full-blown argument with myself, debating things from different points of view. Most of the time, though, the experience is more fragmentary: thoughts and feelings that are close to being put into language, but are not yet quite the kind of speech you would hear spoken out loud. Vygotsky likened this transition of thought into speech to "a cloud shedding a shower of words". Condensed or expanded, this rich internal dialogue must hold clues to understanding the distinctively creative, flexible properties of human thought.

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