

Symposium on Inner Speech

Organizer: Christopher Gauker

Summary:

The nature of inner speech is a growth field in philosophy, psychology, neuroscience and linguistics. The large number of publications on inner speech within the last ten years in all of these areas attests to its importance. Inner speech raises fundamental philosophical and empirical questions. Is there unconscious as well as conscious inner speech? Is inner speech literally a kind of speech, or is it only an imaginative representation of speech? What properties does it share with overt speech? Is there a difference between the speech acts possible in inner speech and those possible in overt speech? What is the function of inner speech? If it is merely a supplement to conceptual thought, what does it contribute? If it is itself a medium of conceptual thought, is it only one among others, or is it the sole medium of all conceptual thought? What are the faculties of mind that are responsible for the production of inner speech? What might be the roles of imagination, motor systems, and memory?

The symposium here proposed will bring together four accomplished inner speech researchers, whose presentations will illustrate four kinds of questions that can be asked about inner speech. Bo Yao, a neuroscientist from Lancaster University, will explain how we can test the proposition that spontaneous inner speech (as opposed to experimenter-provided verbal cues) facilitates perceptual object recognition. Dr. Yao takes this as support for a conception of inner speech as facilitating predictive processing. This talk will illustrate the study of the *psychophysical effects* of inner speech. Jutta Mueller, a cognitive scientist from the University of Vienna, will present data indicating that in people who frequently engage in conscious inner speech there is more cross-talk between the brain's language network and areas of the brain responsible for the integration of information, and there is more cross-talk between the brain's default-mode network and regions responsible for such things as semantic memory. This talk will illustrate the study of the function of inner speech *in the economy of the brain*. Nikola Kompa, a philosopher from the University of Osnabrück, will argue that the internalization of speech can account for the formation of beliefs of the kind that we think of as functioning to determine one's social identity. This talk will illustrate relevance of the topic of inner speech for *social philosophy*. Finally, Christopher Gauker, a philosopher from the University of Salzburg, will argue that inner speech should be regarded as a product of a more general capacity that he labels *constructive imagination*. This talk will illustrate debates about the nature of inner speech as *mental representation*.

How does inner speech resolve visual uncertainty? Testing the precision modulation account

Bo Yao, Department of Psychology, Lancaster University

Inner speech - the silent production of language in our minds - remains theoretically elusive despite decades of research. This talk introduces Linguistic Active Inference Theory (LAIT), which proposes that inner speech augments the brain's predictive processes by deploying linguistic categorical priors that constrain perceptual inference under uncertainty. Through language's efficiency, extendibility, and generativity, inner speech anchors complex sensory experiences in linguistic forms for rapid categorical inference and unpacks abstract goals into situated actions for motor control.

I present an empirical paradigm designed to test LAIT's core prediction: that self-generated inner speech modulates inference under perceptual uncertainty by deploying high-precision linguistic priors. Critically, existing evidence for language's influence on perception derives primarily from externally provided verbal cues - whether self-generated inner speech produces comparable effects remains underexplored.

In this task, participants viewed videos of everyday objects that progressively unblur over 10 seconds via Gaussian blur reduction; they pressed a key and typed their response once they recognised each object. This dynamic paradigm creates a continuous uncertainty gradient, capturing both recognition thresholds and decision timing. Participants completed the task under two counterbalanced conditions: articulatory suppression (continuously verbalising "aluminium" to block inner speech) versus foot tapping (a motor control task allowing speech processes). Individual differences in verbal thinking are measured using the Internal Representations Questionnaire.

LAIT predicts a specific signature: when inner speech is used to make an inference, linguistic priors enable early but potentially premature categorical commitments, producing more variable decision times. This variability arises because some linguistically-driven guesses succeed early while others prove incorrect, requiring additional time for re-inference and error correction. Articulatory suppression should eliminate this variable guessing, forcing conservative evidence accumulation and yielding slower but more uniform responses. Crucially, this effect should be pronounced only in individuals who habitually rely on verbal thinking; low-verbal thinkers are likely to show minimal condition differences as they may not rely on language to resolve perceptual uncertainty. Time-course analysis will test whether the interference effect concentrates during high-uncertainty phases (early in trials when objects remain more blurred), diminishing as sensory evidence becomes conclusive. Pilot data (N=24) suggest that articulatory suppression does alter decision patterns in ways consistent with the elimination of linguistically-mediated priors, with effects moderated by verbal thinking preferences. The preregistered study will employ Bayesian sequential testing to provide conclusive evidence for LAIT's precision modulation mechanism using this paradigm.

Phenomenology of inner speech explains interindividual differences in the brain's resting-state networks

Olga Kepinska^{1,2,3}, Priscila B. Borges⁴, Irene Balboni⁵, Alessandra Rampinini⁵, Raphael Berthele⁶, Jutta L. Mueller^{4*} & Narly Golestani^{2,3,5*}

1. Laboratoire Parole et Langage, CNRS, Aix-Marseille Université

2. Department of Behavioural and Cognitive Biology, Faculty of Life Sciences, University of Vienna

3. Vienna Cognitive Science Hub, University of Vienna

4. Department of Linguistics, University of Vienna

5. Faculty of Psychology and Education Science, Department of Psychology, University of Geneva

6. Institute of Multilingualism, University of Fribourg, Fribourg, Switzerland

* = joint last authorship

Presented by: Jutta L. Mueller, Department of Linguistics, University of Vienna

Humans experience their thoughts, feelings and perceptions in very different ways. This is particularly evident in the domain of inner speech. While some perceive an almost constantly active inner conversation including a voice with rich sensory characteristics, others report the complete absence of inner speech. The experienced forms and contexts of inner speech can be quantified using introspective methods such as questionnaires or experience sampling methods. Several studies linked interindividual differences captured by such measures to performance on cognitive tasks. While there is some evidence that individuals who experience more inner speech perform differently on higher and lower-level cognitive tasks, e.g. meta-cognitive judgements or object perception, it is not known whether and how such differences are reflected in the human mind and brain beyond specific task contexts. If the experience of inner speech is a robust personal trait that generalizes over many contexts, one should assume that it is deeply rooted in the functional architecture of the brain.

Recent years have brought many advances in the understanding of connectivity in the functional networks of the brain at rest and during task performance. Resting-state functional magnetic resonance imaging (fMRI) has discovered the so-called default-mode network (DMN), which is anti-correlated to demanding cognitive tasks and has been assigned the role of internally oriented mentalization, while the brain's language network (LN) – which partially overlaps with the DMN – is the task-related functional network that is typically engaged during language processing.

In this study, we aimed to establish whether people's habit of engaging in internal verbal reasoning was related to the spatial pattern of brain coactivation with the brain's LN and DMN, during resting state fMRI. For this, we correlated interindividual differences in the experience of inner speech, as measured by an introspective questionnaire (internal reasoning questionnaire; IRQ), with the extent and spatial configuration of two brain functional connectivity networks at rest. We correlated scores on the IRQ verbal factor with two aspects

of whole brain connectivity, that involving the DMN and that involving the LN. In participants reporting high levels of inner speech we found higher levels of cross-talk between the LN and right hemispheric brain regions known to be relevant for executive functions, visual-perceptual processing, sensory and multimodal integration and abstract reasoning. Similarly, in participants reporting higher levels of inner speech we found higher levels of cross-talk between the DMN and bilateral and left-lateralized brain regions known to mediate, e.g., semantic and self-referential memory and thought as well as speech or action control. Jointly, these findings suggest that participants' introspective reports about their inner speech habits go along with marked differences in their brains' networks even when no particular task is performed. On the one hand, the findings can provide a neurobiological foundation to the experiential reports. On the other hand, they converge with previous reports that intrinsic brain functional connectivity patterns reflect individual differences in skill and or performance, in our case extending this literature in showing that it also correlates with the propensity to experience inner speech.

Belief formation and inner speech

Nikola Kompa, Institute for Philosophy, University of Osnabrück

According to the traditional view, humans form beliefs in a reason-responsive manner. However, recent debates in political epistemology and cognitive science concerning motivated reasoning, conspiratorial beliefs, and tribal thinking paint a different picture. In response, the idea that there are two types of belief has emerged (Westra, E., *Philosophical Perspectives* 2023; Mayer, M, et al. *Cognition* 2026). On the one hand, there are epistemic beliefs, which are formed on the basis of reasons or evidence. On the other hand, there are so-called symbolic or identity-representing beliefs, which serve a different function, such as signalling one's social identity. The question of how symbolic beliefs are formed has received rather little attention thus far. In this talk, I will examine the potential role of inner speech in this process. To this end, I will briefly introduce the account of inner speech that I favor. According to this broadly Vygotskian account, inner speech is internalised social speech. Language is initially acquired as a means of social interaction, but over time it becomes internalised, turning into a cognitive tool. Importantly, children internalise not only a system of labels and rules, but also a set of socio-linguistic practices such as argumentation, dialogue, storytelling, and joint problem-solving (Kompa, N., Bloomsbury 2024). However, they do not simply learn to engage in these practices offline. They also internalise the normative expectations that govern these practices, together with certain content and assumptions. They internalise 'the voice' of their social group (an idea found in the work of G. H. Mead and, more recently, M. Tomasello). They adopt these assumptions not because they have been given reasons for their truth, but rather without critical examination. However, by repeating these assumptions in their inner speech, they may actually come to believe them to be true. There is empirical evidence suggesting that people tend to believe something is true if they hear it repeatedly — the so-called 'truth effect' (Hasher, L. et al. *Journal of Verbal Learning & Verbal Behavior* 1977). Moreover, while these assumptions may not initially be explicit or fully integrated with other beliefs, expressing them through

inner or outer speech can make them more explicit (Frankish, K., Cambridge University Press 2004) and lets them guide behaviour.

The imagination theory of inner speech

Christopher Gauker, Department of Philosophy, University of Salzburg

What capacity of the mind is the source for inner speech? Many authors say that an episode of inner speech is a product of a forward model, stimulated when commands to speak are sent to the motor systems of speech, which becomes conscious when the commands are aborted. But it is not plausible that the products of forward models always become conscious when the initiating motor commands are aborted, and this account fails to account for the interactions between inner speech and episodes of visual and auditory imagery.

An alternative answer rests on a conception of constructive imagination in general. We use visual constructive imagination on a daily basis when we figure out how to put objects together, for instance in deciding which arm hole of an overcoat to stick one's arm through or in figuring out how to wrap a sandwich in plastic wrap. We use constructive imagination, both visual and auditory, to form mental imagery of objects and events that we have never perceived. We should expect that imagery is constructed in accordance with methods of construction that operate on the structure of the quasi-perceptual representations that constitute mental imagery. Mental imagery is often unconscious, but it can become conscious as way of providing candidates for attention.

According to the imagination theory of inner speech, inner speech is a special case of constructive imagination in which the imagery constructed represents an episode of speech. The methods of construction will be the same as those by which acts of speech are constructed, with the difference that what is constructed is only a representation of speech and is not an act of speech. These methods will ensure that episodes of inner speech represent grammatically correct utterances of sentences and that other aspects of coherent, useful discourse are adhered to. Inner speech, so conceived, may serve as the medium for a kind of a distinctive kind of thought. Much inner speech may be unconscious. The auditory imagery of inner speech is the special case of inner speech in which the representation of speech becomes phenomenally conscious. The function of the consciousness of inner speech is to provide candidates for attention.

A consequence of the imagination theory of inner speech is that inner speech is not itself speech but only a representation of a nonexistent episode of speech. We can nonetheless say that inner speech also indirectly represents that which the nonexistent episode of speech represents. This kind of double representation is familiar from sound recordings of speech, which represent the sound of the recorded speech, but also represent indirectly the same things that the speech that was recorded represented. Such double representation characterizes also AI-produced sound representations of speech that do not record any actual speech.