Resistance to Articulatory Interference in Auditory Verbal Aphantasia

Téo Pesci (teo.pesci@univ-grenoble-alpes.fr)[1], Alan Chauvin[1], Romain Grandchamp[1], Sharon Peperkamp[2], Hélène Lœvenbruck[1]

[1] Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, LPNC, 38000 Grenoble, France

[2] Laboratoire de Sciences Cognitives et Psycholinguistique (Département d'Études Cognitives, École Normale Supérieure, PSL Research University / Ecole des Hautes Études en Sciences Sociales, Centre National de la Recherche Scientifique), Paris, France

Inner speech, or the covert production of language, often includes auditory percepts. However, individuals with auditory verbal aphantasia (AVA) report no such phenomenology, reflecting variation in inner speech condensation [1, 2]. While most people frequently experience expanded inner speech (an "inner voice" with auditory qualities), individuals with AVA appear to rely predominantly on a condensed form. Because inner speech is closely linked to speech production control, studying AVA may clarify its underlying mechanisms. Fluent speech requires rapid motor control, yet delayed sensory feedback makes external monitoring inadequate for online error correction. Major models therefore posit internal control via predictive mechanisms (efference copy, multisensory prediction, [3-5]) or intermediate representations (internal speech [6,7]). The ConDialInt model proposes that inner speech emerges from interruptions in the hierarchical speech production process [3]. Condensed inner speech results from early interruption, whereas expanded inner speech arises from later truncation, yielding a sensory-rich "inner voice." AVA inner speech is hypothesized to reflect interruption after formulation but before motor planning (phonetic encoding), preserving phonological representations while lacking sensory qualities. To investigate this hypothesis, we conducted a preliminary study with 53 participants grouped by self-reported auditory imagery levels: AVA (N=10), hypophantasia (N=14), and typical effective imagery (N=29). Participants completed a rhyme judgment task under two conditions: articulatory suppression (which interferes with motor planning [8]) and a control dual-task (foot-tapping with auditory suppression). To assess the specific cost of disrupting motor planning, we analyzed the Group x Condition interaction. While articulatory suppression increased response times across all groups, accuracy analyses revealed a significant interaction: effective imagers were more impacted by articulatory suppression, suggesting reliance on motor planning. These interference effects (Δ performance) are illustrated in Figure 1. By contrast, participants with AVA and hypophantasia showed significantly attenuated performance drops, indicating resistance to articulatory interference. These findings suggest that non-sensory phonological representations are sufficient for

phonological judgments, and that motor planning can be bypassed, reducing susceptibility to dual-task interference. A quasi-replication with a larger AVA sample and tighter control of secondary-task performance is underway to assess the robustness of these findings.

References

[1] Alderson-Day, B. & Fernyhough, C. (2015). Inner Speech: Development, Cognitive Functions, Phenomenology, and Neurobiology. *Psychological Bulletin*, 141, 931-965

[2] Huson, N., Vanbuckhave, C., Pesci, T., Chauvin, A., & Lœvenbruck, H. (in press). Investigating auditory verbal aphantasia with a listening test. *L'Année Psychologique.*

[3] Grandchamp, R., Rapin, L., Perrone-Bertolotti, M., Pichat, C., Haldin, C., Cousin, E., Lachaux, J.-P., Dohen, M., Perrier, P., Garnier, M., Baciu, M., & Lœvenbruck, H. (2019). The ConDialInt Model: Condensation, Dialogality, and Intentionality Dimensions of Inner Speech Within a Hierarchical Predictive Control Framework. *Frontiers in Psychology*, 10, 2019. https://doi.org/10.3389/fpsyg.2019.02019, 10, 2019.

[4] Parrell, B., Lammert, A. C., Ciccarelli, G. & Quatieri, T. F. (2019). Current models of speech motor control: A control-theoretic overview of architectures and properties. The *Journal of the Acoustical Society of America*, 145, 1456-1481

[5] Pickering, M. J. & Garrod, S. (2013). An integrated theory of language production and comprehension, *Behavioral and Brain Sciences*, 36, 329-392

[6] Levelt, W. J. M.; Roelofs, A. & Meyer, A. (1999). A theory of lexical access in speech production. *Behavioral and brain sciences*, 22, 1-38

[7] Quené, H. & Nooteboom, S. G. (2024). Some properties of mental speech preparation as revealed by self-monitoring. *Speech Communication*, 158, 103043

[8] Baddeley, A., & Lewis, V. (1981). Inner Active Processes in Reading: The Inner Voice, the Inner Ear, and the Inner Eye. In *Interactive Processes in Reading*. Routledge

Figure 1: Interference effects on rhyme judgment (Δ: articulatory suppression minus control) for reaction time (A) and accuracy (B) across the typical effective imagery, hypophantasia, and AVA groups. The dashed line at zero indicates the absence of an articulatory suppression interference effect. * p < .05.