

D4.1 – Project Communication Kit

BINGO

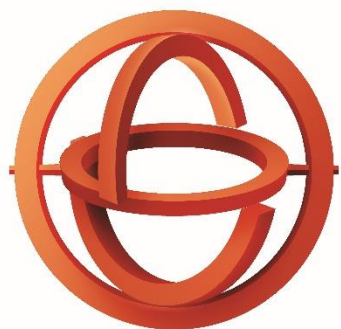
Brain Imagined-Speech Communication



**Funded by the
European Union**
NextGenerationEU

Greece 2.0

NATIONAL RECOVERY AND RESILIENCE PLAN



H.F.R.I.
Hellenic Foundation for
Research & Innovation

The research project is implemented in the framework of H.F.R.I call “Basic research Financing (Horizontal support of all Sciences)” under the National Recovery and Resilience Plan “Greece 2.0” funded by the European Union – NextGenerationEU (H.F.R.I. Project Number: 15986).

Dissemination level:	Public (PU)
Contractual date of delivery:	Month 3, 27/02/2024
Actual date of delivery:	Month 3, 23/02/2024
Work Package:	WP4 - Dissemination, communication and uptake of scientific results
Task:	T4.1 - Project Communication
Type:	Other
Approval Status:	Final
Version:	v1.0
Number of pages:	12
Filename:	D4.1_ProjectCommunication_v1.docx
<p>Executive Summary: The D4.1 – Project Communication Kit, outlines the communication and dissemination strategy for the BINGO project. BINGO aims to develop a Brain-Computer Interface (BCI) system capable of decoding imagined speech through advanced machine learning techniques and a neuro-informed approach. To maximize impact and engagement, this deliverable presents the key communication tools designed for the project: a project leaflet, the official website, and social media channels. These tools will facilitate effective outreach, ensuring visibility among researchers, industry stakeholders, and the broader public. The document details the structure, content, and objectives of each communication component, demonstrating how BINGO will enhance knowledge dissemination and collaboration within the scientific and technological communities.</p>	
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HISTORY

Version	Date	Reason	Revised by
V0.1	15/02/2024	Table of Contents	Fotis Kalaganis
V1.0	23/02/2024	Input and Final Version	Spiros Nikolopoulos

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ABBREVIATIONS AND ACRONYMS

Abbreviation	Definition
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INTRODUCTION

The BINGO project is a groundbreaking initiative focused on developing a Brain-Computer Interface (BCI) system capable of decoding imagined speech. By leveraging advanced machine learning (ML) techniques and a carefully structured experimental framework, BINGO aims to enhance BCI systems' interpretability and scalability. To ensure effective dissemination and engagement with various stakeholders, BINGO has developed a comprehensive communication strategy, which includes a project leaflet, website launch, and social media outreach.

LEAFLET PRESENTATION

The BINGO project leaflet is designed to provide a concise yet informative overview of the project's objectives, methodologies, and expected outcomes. The leaflet serves as an essential tool for engaging with researchers, industry partners, and the general public.

KEY ELEMENTS OF THE LEAFLET:

- **Concept of the BINGO project:** A brief introduction to the BINGO project, highlighting its significance in the field of BCI.
- **Research Objectives:** Explanation of the primary goals, including the development of robust decoding algorithms and a neuro-informed approach.
- **Long-term Vision:** Overview of the experimental protocol, data collection process, and machine learning techniques employed and insights into how BINGO will advance imagined speech decoding and its implications for assistive technologies.
- **Contact Information:** Website link, social media handles, and key contacts for collaboration opportunities.
- **The project LOGO and the HFRI funding information**

The leaflet is visually engaging, with a clear and structured layout, integrating infographics, particular color palette (more details in D7.1), project branding, and a compelling call to action (Figure 1).

Concept

BINGO aims to understand and decode the neural processes of imagined speech as registered by means of an EEG device. In plain words, BINGO focuses on creating the essential methodological framework that will translate the imagined pronunciation of words/phonemes/syllables into actual text. BINGO stands over the assumption that EEG signals indeed hold the essential information to discriminate between different imagined speech pronunciations. In order to achieve its ultimate objective (i.e., enabling imagined speech as a robust BCI paradigm), BINGO aims to pass through the following individual challenges that hold the potential to pave the way for natural and intuitive BCI applications. In essence, BINGO is:

- ✧ Developing, neuro-informed, imagined speech decoding schemes (i.e., algorithms tailored to the neural phenomena of imagined speech) for EEG signals.
- ✧ Supporting an incremental vocabulary under the imagined speech paradigm (i.e., support new words using pre-trained classifiers that can learn incrementally using a small number of new trials).
- ✧ Investigating the imagined speech at the level of semantic perception (i.e., compare neural patterns of imagined words of identical meaning expressed in different languages).
- ✧ Creating a publicly available bench-marking framework (experimental protocol, dataset, evaluation metrics) that enables the fair evaluation of computational models dealing with the aforementioned challenges.

Research Objectives



RO.1
Reliable algorithms for imagined speech decoding

Brain decoding algorithms constitute the 'heart' of a BCI system. Hence, the main objective here is to conceive EEG decoding algorithms by combining recent advances in the fields of neuroscience and Machine Learning. Beyond the conceptualization of novel decoding schemes, it is among our objectives to achieve a deeper understanding of the neural processes that are related to the imagined speech and exploit them towards developing reliable and effective Machine Learning algorithms.

RO.2
Incremental vocabulary

The objective is to establish the decoding schemes for an imagined speech BCI system that will be able to incrementally learn how to decode new classes (e.g., new imagined words/phonemes/syllables) using a small number of additional trials, without compromising the robustness of the existing vocabulary.

Research Objectives



RO.3
Connections between same meaning in different languages

The main scope of this objective is to initially study the neural activations when one imagines words with identical meaning but in different languages (e.g., 'no' and 'ochi'; the greek word for no). Then, to establish a framework that uncovers potential interconnections between such activation patterns and apply transfer learning approaches that deal with the aforementioned interconnections.

RO.4
Benchmarking framework

The main concept of this objective is to create a publicly available EEG-based dataset, oriented towards the imagined speech paradigm. The dataset will be formulated accordingly in order to facilitate a benchmarking framework, hence, it will be accompanied by carefully crafted evaluation metrics.

Long-term vision



We imagine a world where communication flows seamlessly between the mind and the digital realm, where language doesn't need to be spoken aloud but is instead translated directly from thought. This is the long-term vision behind BINGO, a system that can decode inner speech using EEG, a revolutionary development that promises to transform how we interact with technology and each other.

The journey to this vision begins with the intricate neural activity tied to inner speech—the thoughts and words that we speak to ourselves without voicing them out loud. With highly advanced signal processing algorithms and deep neural networks, we aspire to pave the way towards fulfilling this vision.

The potential applications are vast. For people with disabilities that limit speech or movement, this technology may offer an entirely new form of expression, opening up avenues for independence and social connection. A person unable to speak could converse with loved ones or colleagues simply by thinking, their thoughts instantly transcribed into speech via an auditory output or displayed as text on a screen. For those suffering from conditions like ALS or severe stroke, this could provide a lifeline to the outside world—preserving autonomy and dignity.

Research team

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BINGO

Brain Imagined-Speech Communication

bingo-project.gr

Figure 1 Leaflet Figure of BINGO project

WEBSITE LAUNCH

The official BINGO project website (<https://bingo-project.gr/>) serves as the primary digital hub for disseminating project-related information, updates, and resources (Figure 2).

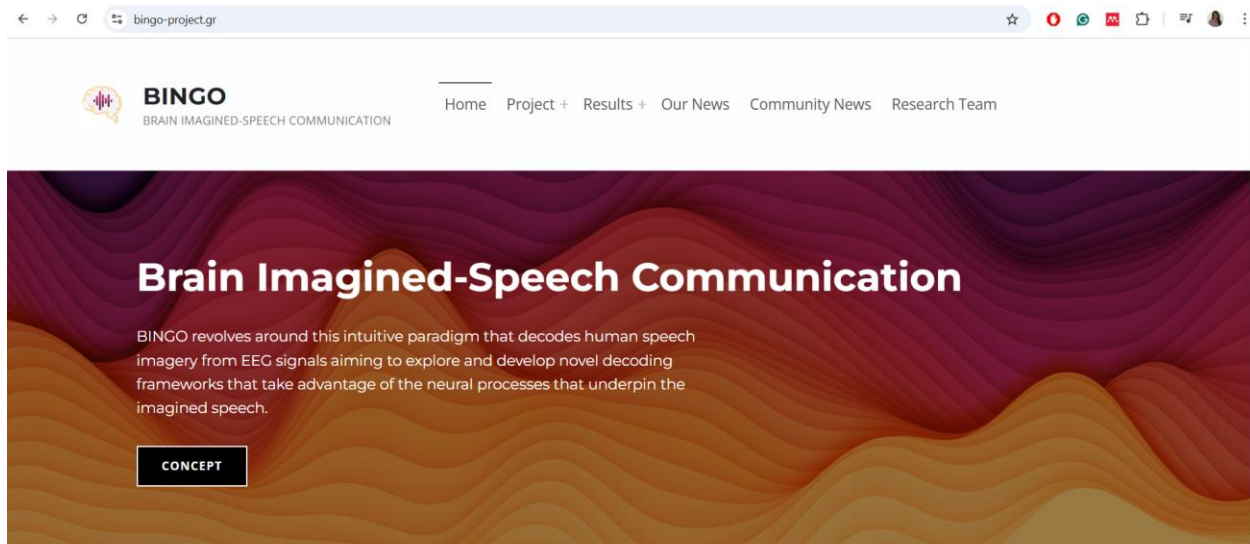


Figure 2 BINGO Website

WEBSITE FEATURES & SECTIONS:

- **Home Page:** Provides an engaging introduction to the project, featuring a concise summary of BINGO's objectives, recent updates, and quick links to key sections.
- **The Project:** An overview of BINGO, including the project's mission, objectives, and research pillars, offering insights into its scientific and technological foundation.
- **Research Team:** Highlights the project's research team and institutions contributing to BINGO. It includes logos, descriptions, and links to their respective websites.
- **News & Events:** A dedicated section for sharing project-related announcements, milestones, upcoming events, and relevant industry news.
- **Results:** A repository of project deliverables, providing access to public reports and documentation that showcase research progress and findings and a collection of scientific papers and research outputs associated with BINGO, ensuring transparency and knowledge sharing.
- **Community News:** A key feature of the website, this section provides access to the benchmarking news developed within the project.

The website is designed for accessibility and responsiveness, ensuring an optimal user experience across different devices and screen sizes. It serves as a key tool for knowledge dissemination, stakeholder

engagement, and research collaboration. The website also includes the related information of the HFRI funding

Info

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SOCIAL MEDIA STRATEGY

To maximize engagement and outreach, BINGO maintains an active presence on social media, primarily through its Facebook page (<https://www.facebook.com/BINGOBCI/>).

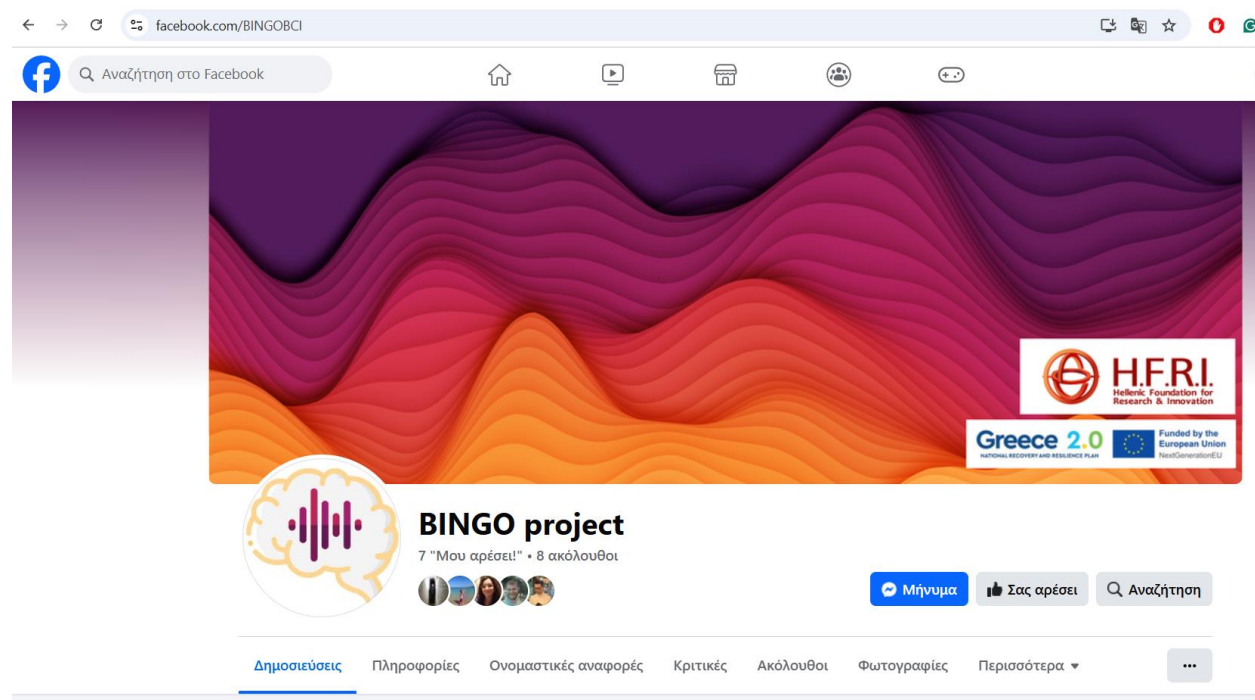


Figure 3 BINGO Facebook Account

SOCIAL MEDIA GOALS:

- **Community Engagement:** Creating an interactive platform where researchers, students, and the general public can discuss the latest advancements in BCI technology.
- **Project Updates:** Regular posts on key milestones, research breakthroughs, and upcoming events.
- **Educational Content:** Sharing infographics, explainer videos, and blog posts to increase awareness of imagined speech decoding and its applications.
- **Collaboration & Networking:** Engaging with related research projects, institutions, and industry leaders to foster partnerships.

CONTENT PLAN:

- **Weekly/Monthly Posts:** Updates on research progress, publications, behind-the-scenes insights, and team activities (e.g., workshops, conferences).
- **Related Posts for Research Community:** Periodic posts featuring related content to BCI technology.
- **Event Coverage:** Updates and highlights from conferences, presentations, and workshops attended by the BINGO team.

CONCLUSION

The BINGO Project Communication Kit provides a structured approach to disseminating project information effectively. By leveraging a well-designed leaflet, an informative website, and an active social media presence, BINGO ensures that its research reaches a broad audience and fosters engagement with key stakeholders. These communication tools will be continuously updated to reflect project progress and new developments in the field of imagined speech decoding.