

Disciplinary knowledge integration between Systemic Functional Linguistics and Generative Artificial Intelligence

Sandra Petroni

University of Rome ‘Tor Vergata’

1. Introduction

Systemic Functional Linguistics (SFL) has long been recognized as a comprehensive and systematic framework to analyse language as a functional, socially-situated resource for meaning-making. Among its most valued features is its potential for accessibility and applicability, which have increasingly become pivotal considerations in its wider interdisciplinary use (Halliday, 2006; Zhang & Hu, 2021; Caldwell et al., 2024). This contribution focuses specifically on the notion of applicability as a guiding concept for discussion. The primary aim is to explore both the challenges and opportunities connected to enhancing SFL’s applicability and extending its transdisciplinary potential.

The starting point for this investigation is, in fact, the development of a holistic theoretical framework (Petroni, 2023, 2026) that combines the foundations of SFL with insights from platform studies. Recent work in social semiotics and platform studies has increasingly conceptualised digital platforms as semiotic technologies that structure meaning-making practices (Djonov & van Leeuwen, 2018; Moschini, 2018; Zhao, Djonov & van Leeuwen, 2014). These studies highlight how interface design, algorithmic infrastructures and software environments participate in the production and circulation of discourse. Building on this trajectory, the present study proposes a more explicit integration with Systemic Functional Linguistics. While platform-oriented analyses have explored the semiotic affordances of interfaces and digital infrastructures, the metafunctional architecture of SFL offers a systematic model for analysing how meaning is organised across ideational, interpersonal and textual dimensions. The framework proposed here therefore aims to extend existing platform-oriented approaches by providing a functional linguistic model capable of mapping the interaction between interface design, algorithmic processes and discursive meaning-making.

The purpose of this integration is to deepen our understanding of meaning production within digital environments, encompassing various communicative interactions such as human-to-human, human-to-machine, and machine-to-human. In subsequent steps, this research veers towards the examination of how Artificial Intelligence (AI) – and in particular, ChatGPT – encodes and generates linguistic instantiations, with the broader goal of applying SFL to develop and foster digital literacies. The initial task, therefore, is to consider SFL as a truly applicable linguistics.

The concept of applicability differs markedly from that of applicability. Halliday himself made this distinction in an interview with Anne Burns in 2005, later published in 2006. When asked whether SFL is an applicable or applicable linguistics, Halliday responded:

“Applicable”, to me, has a difference. If I say applicable, then it is with a sense of being applicable to something. I’m not making a big issue of this! But there is a significant difference. If I say something is “applicable” then it refers specifically to some task or at least some particular sphere of action. I want a more general sense, that of “capable of and designed for being applied”.

(Halliday & Burns, 2006, p.124, emphasis in original)

Echoing this position, Matthiessen argues that:

[A]pplicable linguistics is a kind of linguistics where theory is designed to have the potential to be applied to solve problems that arise in communities around the world, involving both reflection and action (see Halliday, 1985, 2002). [...] To be applicable, an approach to language must be powerful – it must empower its practitioners, and the power to apply derives from holistic theory and comprehensive descriptions.

(Matthiessen, 2012, pp.436–438)

It is precisely this theoretical and descriptive richness that allowed SFL to extend beyond linguistics into fields such as education, translation, and early computational analysis as early as the 1960s and 1970s. This cross-disciplinary reach has been supported by SFL’s permeability to diverse theoretical influences, including anthropology, anthropological linguistics, sociology, education, neuroscience, multimodality, computational linguistics, and, more recently, AI.

Indeed, the development of SFL has always taken place in dialogue with adjacent disciplines. As Halliday (1985, p. 6) observed, a defining characteristic of systemic theory is its “permeability from outside,” noting that it “has never been walled in by disciplinary boundaries.” SFL, by its very nature, embodies a trans-disciplinary orientation. The development of SFL has always been grounded in a socially oriented theory of language. Halliday’s early work drew explicitly on anthropological linguistics and sociological perspectives on language as social action (Halliday, 1977). Later developments in multimodal discourse analysis

extended these functional and semiotic foundations to other meaning-making resources beyond language (Kress & van Leeuwen, 2001; Jewitt, 2009). Rather than representing external influences to which SFL is merely “permeable”, these traditions develop from a shared social semiotic orientation in which language is understood as one component within broader multimodal systems of meaning.

With the advent of the 21st century, the convergence of knowledge across disciplines has become a central driver of innovation and theoretical advancement. The growth of linguistic theories now depends on mutual engagement among different schools within linguistics as well as on collaboration with the humanities, social sciences, and natural sciences. Linguistic inquiry itself must be seen as interlingual and interdisciplinary, aligning with transdisciplinary movements that emphasize problem-oriented research and collective responses to complex phenomena.

When a discipline proves inadequate in addressing new communicative demands or practical challenges, it must evolve by integrating insights from other fields. Such integration entails a profound understanding of the contributions and limitations of each discipline and how they can be brought together to enhance one another. Halliday’s view on this is particularly relevant:

Systemic theory has never been walled in by disciplinary boundaries [he reiterates this point in diverse works] this is not to imply that the concept of a discipline is vacuous, but that a discipline is defined not by what it studies but by the questions it seeks to answer, so that in order to understand language, which is what the questions of linguistics are about [...], we have to study many other things besides, and hence a linguistic theory has to be a means of intersemiotic translation, interfacing with other theories of social meaning and so facilitating the input of findings from elsewhere. (Halliday, 2003a, p.192)

In today’s digital landscape, the integration between SFL and computer science — particularly in relation to Natural Language Processing (NLP) and AI — is both necessary and urgent. The pervasive role of digital technologies in organizing communication and shaping social practices requires linguistic theories that can respond to the nuances of digital discourse. The research question, in fact, is: What contribution can SFL make to the analysis of AI and its underlying architectures, such as Large Language Models (LLMs)? Matthiessen highlights the significance of early work in computational SFL by scholars like O’Donnell and Bateman (2005), arguing that although less publicly visible than research in education, healthcare, or organizational communication, computational SFL has made foundational contributions to applicable linguistics. This includes a degree of formal explicitness that is frequently absent in mainstream discourse analysis.

In my recent research (Petroni, 2023, 2026), I have experimented with the integration of SFL, Multimodality, and Platform Studies to develop a holistic framework capable of analysing meaning-making processes in digital contexts. This framework examines how representations are constructed and interpreted on platforms, including the roles of both human and non-human actors. In the following section, the theoretical model is outlined in greater detail to demonstrate its utility for examining meaning production in digitally mediated communication.