Beyond Hockett's 'Design Features of Language'

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Language is seen as one of, if not *the*, most defining traits of our species. But what is language, and what makes it so unique? In 1960, Charles Hockett published "The origin of speech", enumerating 13 design features that are allegedly shared across human languages, and when taken together, distinguish language from other communication systems (Hockett, 1960; 1963). This foundational work marked a renewed evolutionary approach to the study of language, and has been highly influential (e.g. Wacewicz et al. 2022). For generations of scientists, Hockett's design features have been the default go-to model for evaluating and comparing non-human animal communication systems with human language.

However, in the roughly 65 years since they were first proposed, these features have been criticized (e.g. Oller 2004), and even called a "non-starter" (Wacewicz & Żywiczyński 2015). Extending on these important critiques, here we argue that Hockett's design features need to be interpreted within a broader framework that is in line with advances in linguistics, cognitive science, and

animal communication and cognition to facilitate productive inquiry into language evolution (Pleyer et al. 2025). We focus on three broad themes that characterize our modern understanding of language, each highlighting the need for a fundamental re-evaluation and reconceptualization of Hockett's design features: (i) **multimodality and semiotic diversity**; (ii) **the functions of language**, and (iii) **language as an adaptive system**. For example, while one of Hockett's design features is the *vocal-auditory channel*, modern research has shown that language is fundamentally multimodal (e.g. Cohn & Schilperoord, 2024; Özyürek, 2021). Language exhibits modal flexibility and can be realised in different modalities (e.g., sign language; Stokoe, 2005). Even speech is tightly integrated with semiotic channels such as co-speech gesture, gaze, and facial expressions (Levinson & Holler 2014). Similarly, many animal species communicate using multimodal signals (Zhang & Pleyer, 2024), highlighting the prevalence of multimodality across communication systems. Language also exhibits semiotic diversity, including not only discrete arbitrary elements, but also many graded iconic aspects, including visual iconicity in sign and gesture, as well as iconicity in speech such as in onomatopoeia ("buzz", "crash") and prosody (e.g. when talking about "slooow" events; Perlman et al. 2015). Regarding the functions of language, Hockett's feature of *specialization,* treats the function of language as the transfer of semantic information using a discrete "code". However, modern research shows that language serves multiple functions, such as social signaling (Smaldino & Turner 2022) and cognitive augmentation (Lupyan 2012), and its meaning-making relies heavily on pragmatics, ostension, and inference (Heintz & Scott-Phillips 2023). In fact, ostension is central for characterising human language as it enables interlocutors to use any behaviour and turn it into a communicative act, which is also the root of the multimodality and semiotic diversity of language. The importance of pragmatic factors and the inadequacy of the code model is also increasingly recognised in animal communication (Cartmill 2023; Fröhlich et al. 2025). In addition, while Hockett conceived language as characterised by a set of static features, modern research views language as a dynamic and adaptive system (Beckner et al. 2009), which is continuously changing. In this sense, the design feature of *cultural transmission* is a unique process that drives the creation of other design features such as *arbitrariness, semanticity* and *duality of patterning* via interaction and transmission, as shown in experimental research on the cultural evolution of language (Motamedi et al. 2019; Kirby et al. 2015; Raviv et al. 2019) (see Fig. 1).

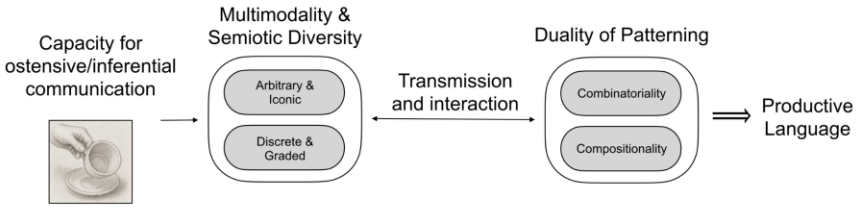

Figure 1. Human language builds on ostensive/inferential communication, which supports the rich multimodality and semiotic diversity of language. Through transmission and interaction, combinatoriality and compositionality emerge, enabling productivity and making it possible to communicate about anything within human conceptual capacity, including displaced referents.

The three themes we describe better reflect the current research landscape and help guide future comparative work in animal communication and cognition in pursuit of a unified framework for studying the evolution of language.

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