Sign Systems Studies 53(3/4), 2025, 357–397

Dumb intelligence? Translation as technological mediation

Hongying Xu,[1] Alin Olteanu,[2] Cary Campbell[3]

Abstract. We propose a semiotic approach to understanding and assessing language technologies. Specifically, by adopting a recent semiotic and broad concept of *translation*, developed by Kobus Marais, we bring semiotic theory into the service of philosophy of technology. Our perspective reveals that commonly assumed expectations about language generative technologies are mistaken and misleading when shaped through an ideal of engineering humanlike interlocutors, which we illustrate with examples. We find that (software) engineering pursues this ideal, which, fuelled by classical humanism, assumes that language is an anthropic marker. By explaining (technological) emergence as a semiosic process, we develop a robust underpinning for the Mind–Technology Thesis, namely refuting mind-and-matter substance dualism through an evolutionist perspective that construes technology as mind-work. In this vein, semiotics corroborates with externalist theories of mind and postphenomenology in understanding mind and technology as mutually intrinsic. This leads to a semiotics-grounded advocacy of the view in philosophy of technology, championed by Elena Esposito, that for artefacts properly to communicate with biological organisms, they do not require "intelligence".

Keywords: translation; technology; extended mind; large language model; mediation

[1] School of Foreign Languages, Dalian Maritime University, Dalian, China; e-mail: hongying.xu@dlmu.edu.cn.

[2] Institute of Language Sciences, Shanghai International Studies University; Shanghai, China; Research Institute of the University of Bucharest, University of Bucharest, Romania; e-mail: alin.olteanu@icub.unibuc.ro.

[3] Faculty of Education, Simon Fraser University, Vancouver, Canada; e-mail: cary_campbell@sfu.ca.

https://doi.org/10.12697/SSS.2025.53.3-4.04

Introduction: A semiotic approach to translation technologies

We explore translation, adopting a fully semiotic approach that allows for an externalist and (post)phenomenological perspective on *mind*. We find this approach highly insightful for understanding (newly emerging) translation technologies, leading to the twofold argument that: (1) all translation is technological mediation; which invites (2) a semiotic perspective on *translation technologies*. We find this necessary for overcoming reductionist concepts that separate the social and engineering aspects of technology (see Jasanoff 2015: 2; Coeckelbergh 2022) and, particularly, for better to understand how translation technologies can enhance semiotic freedom by extending (human) cognition.[4] To bridge this split, we build on the semiotic translation theories by Lars Elleström (2018) and Kobus Marais (2019, 2023), based on Charles S. Peirce's pragmatism, which offer a concept not just of translation but of thinking itself as intrinsically intermedial. We explain that this semiotic perspective aligns with the Mind–Technology Thesis (Clowes *et al*. 2021a; Fuller 2022) that technology is what minds do, and reflect on translation technologies from this vantage point. Hence, we are nesting a semiotic notion of technology in Marais's (2019, 2023) theory, which leads, as we explain, to defining technology through the concept of translation. To do so, we think of translation through an externalist account of mind, as primarily ushered in by extended mind theory (Clark, Chalmers 1998; Menary 2010a), which Marais (2023) also explores, particularly as he aims to expand his theory from the perspective of thermodynamics. This opens an avenue to thinking of technology as translation of cognitive import (or, more generally, mind-work). Following this path, we arrive at a conceptualization of *technology as potential semiotic resources that emerge in an interfacing of systems.* To exemplify, the hammer emerges when a human is enabled to imagine it, as a future state, by facing stuff that will become the hammer.

Implicit within the classical humanist assumption that language is the anthropic marker, deeming humans exceptional in (or from) the biological realm, resides a reductionist epistemology that separates the sociocultural from the

[4] 'Human' is a vague and, on most accounts, highly ideological concept, which we want to avoid. To accept our claims on language interfacing, though, a definition of 'human' is unnecessary. We consider that, for the present argument, we do not need a thorough account of 'human/humanity'. Our theory contradicts classical humanist accounts of 'human' through the implications of externalist theories of mind and mind-technology continuity. Without claiming a precise notion, we consider that 'human' is an open concept, implying *evolutionary* and *cyborgian becoming*, which, we find, the concept of 'semiotic scaffolding' can nicely capture (Cobley, Stjernfelt 2015; Olteanu, Ongstad 2024).

technological. Notably, science and technology studies has authorized itself to bridge such epistemological bifurcations (Bijker, Law 1992; Latour 1990). In academia, the distinction has been especially consolidated in discourse studies, where language remains understood as the chief or primary source of knowledge (Cobley 2016: 18), overwriting or reshaping other modalities. As such, stemming from the Foucauldian notion of discourse (Foucault 1977), society-culture and technology are construed as distinct domains that relate to each other, as implied through the view that (social) discourse undergoes *technologization* (Fairclough 2006[1992]). This is at odds with the older idea in philosophy of technology that cognition, culture and technology are inseparable, as cultural objects are only enabled through technology (Kapp 2018[1877]; Kittler 1999[1986]). While discourse studies and philosophy of language imposed the dominating language-centric epistemology of the humanities and social sciences post-WWII, the tenets of philosophy of technology are now making a comeback, under the conditions of the current technological revolution. In general, this is part and parcel of the refutation of classical humanism, whether in post-, trans-, or anti-humanist form, the latter finding specific support in biosemiotics (Cobley 2016: 45–56, 57).

Still, language exclusivism is difficult to uproot from folk imaginaries, as it has become entrenched through the intellectual history of modern humanism and education (Olteanu, Campbell 2023a, 2023b; Campbell, Olteanu 2024; Lacković, Olteanu 2024). It is displayed in popular, engineering and academic sociotechnical imaginaries as a general dissatisfaction with *artificial intelligence* (AI) technologies that fail (to simulate) to converse like human interlocutors. This is the specific issue we discuss here. While there is no consensus on what 'intelligence' is, this broadly shared dissatisfaction demonstrates agreement that intelligence has to do, almost chiefly, with linguistic competence. Tech companies seem to race towards developing an interlocutor that can mirror the linguistic behaviour of humans which, paradoxically, should involve uniqueness and authenticity (Beerends, Aydin 2025; see also Neuruer *et al*. 2018). While language exceptionalism has been refuted beyond doubt by now, placing language within the broad plethora of semiotic systems (Martinelli 2010; Petrilli, Ponzio 2005; Cobley 2016), it still drives the engineering of AI, especially language technologies. A chatbot seems to raise both more enthusiasm and disappointment than other types of technologies, regardless of which of these can better foster human (and non-human) wellbeing. Arguably, the current hype to develop AI technologies is fuelled by breakthroughs in language technologies. Humans seem hooked on engineering an interlocutor, which they may narcissistically consider to be their image. Esposito (2022: 43) observes that "anthropocentric shortsightedness (species chauvinism) occurs today not in denying that machines can be like human beings, but rather in

claiming that machines can only be recognized and appreciated for how well they emulate human activities".

Developing digital computational technologies through language-centric imaginaries replicates old protocols of existing technologies, which drastically limits the production of new media futures and, in these times of planetary crisis, much needed *change*. Against this backdrop, and in an effort also to inform AI engineering, we contribute to science and technology studies by bringing a semiotic perspective on language, mind and technology to broker possible sociotechnical imaginaries that do not revolve around language. While this may seem ironic, we argue for developing language technologies that are not language-centric. This is not an irony, though: language is a powerful technology which should be put to its best use in developing other technologies.

Language (is) technology

In the current global hype for AI technologies, fuelled by high computing capacities put to the service of machine learning algorithms, new language technologies, including translation technologies are flourishing. We use the terms 'language technology' and 'translation technology' to refer to computational technologies that process human language, respectively for translation. Assuming the biosemiotic concept of modelling (Sebeok 1991; Sebeok, Danesi 2000), we think of language technologies as any technologies that build upon linguistic modelling. This encompasses the common sense in which 'language technology' is used to refer to computer programs that can (linguistically) respond to human language, including translation technology, but extends beyond the merely *in silico* processing of language.

We also note that many types of computer coding are not a language technology. While in developing coding languages semantic and syntactic elements of human language (usually English) were employed, coding is not exclusively built upon language. Programming languages are semiotic systems for logical operations where the language of human texts is not always necessary. Also, the syntax and even semantics of language are in many regards not the product of language, but of more basic embodied cognitive competences for assessing logical inference normatively (Lakoff, Johnson 1999; Gallagher 2005; Paolucci 2021). For this reason, computer coding might make use of the affordances of language for logic, but not because they are linguistic (Sowa 2016). A salient example that makes explicit use of semiotic theory is John Sowa's (1992, 2008) Conceptual Graphs system for programming, with its keyboard-typable variations, which translates Peirce's Existential Graphs system of graphically representing inference.

The many semiotic systems that constitute contemporary societies "share the syntaxes of software" (Manovich 2013: 8), which constitutes a breakaway from the language-centrism endorsed by print media and later further disseminated through telegraph, radio, TV and other broadcasting media. This constitutes an opportunity. If Manovich (2013: 21) is correct that the computer is "the new engine of culture", the humanities and social sciences should do well to shake off language-centric epistemologies, as societies are inevitably doing so. We are probably infuriating some colleagues by claiming that for much of literary studies and linguistics our argumentation recommends transformation into, for example, (comparative) media studies and/or semiotics. Semiotic scholarship, too, must actively work to respond to questions on digitalization.

The production of an abundance of useful language technologies, from inter-linguistic translation software, such as DeepL and Google Translate, to language generative technologies that simulate conversation, such as DeepSeek, Kimi and ChatGPT, was enabled by recent progress in AI, unleashed by "abandoning the ambition to reproduce in digital form the processes of the human mind" (Esposito 2022: 4). Such technologies, which keep on being perfected in light of data that they generate in contingency with human language users, are changing human communicative habits. These technologies function in light of a concept of language as a clearly structured system, such as the code through which their logic was formulated. Human languages do not function like that. Human language is situated in the same sense as cognition is situated. We also note the emergence of technologies that perform intersemiotic translation, processing language to generate images, such as Dall-E and Pixlr.

Biosemiotics (Sebeok 1986) has pioneered the argument, on which cognitive and evolutionary approaches to language also agree (Reboul 2017), that spoken language does not render humans exceptional in the animal realm. As a social phenomenon, language in humans is an excellent way of performing things that humans (and other animals) were performing before the accidental possibility of speech and even before language itself.

To our relating of language, translation and technology, recent cognitive semiotics (Paolucci 2021) corroborates with an important argument. Namely, cognitive semiotics insists that, being intertwined with perception, interpretation always supposes mediation (see also Brandt 2020; Zlatev *et al*. 2016). Not only does this imply that all translation, as much as it is strictly interlinguistic or even endosemiosic, is multimodal; it also supports the hypothesis that *mind* and *technology* are continuous (Clowes *et al*. 2021a). This externalist approach to technology is gaining popularity in philosophy of mind as well as science and technology studies. It implies that all semiotic activity, including language, is technological. From this point of view, language is a technology.

As a (bio)semiotic perspective contends that modelling systems change the modelling systems that they build upon (Sebeok, Danesi 2000; Hoffmeyer 2015; Kull 2015; Cobley 2018; e.g. writing changed speech, the printing press changed writing), language technologies are changing language (Hayles, Pressman 2013). That is, human interfacing with machines through language is changing linguistic communication among humans. In this regard, that may be of special interest for linguistics and semiotics, we note that large language models (LLMs) are transforming corpus research (Yu *et al*. 2024; Curry *et al*. 2024) and, as such, the conceptualization of genres and recognition of style, among other categorizations (Olteanu, Ongstad 2024). Language and digital computing technologies are becoming tightly intertwined, not mainly because (written) language is a medium through which computer coding was modelled. Being now ubiquitous, the affordances of digital media are pervading language (Crystal 2006; Leeuwen 2008; Boehm, Mitchell 2009; Danesi 2016, 2017). Language has always been technologically shaped, through cinema, TV, radio, printing press, writing in various forms, music, speaking and so forth. Language is always technologically modelled, diffused and, as such, blended with many technologies because language itself is a technology. If language were ontologically distinct from technology, it could not interact and blend so smoothly with other technologies. Were language not a technology, other technologies could not emerge *from* language.

We are aware that this statement does not only come into conflict with much mainstream linguistics, but also with some extended mind theory outlooks on language (Rupert 2010) that claim that language does not extend cognition. Analysing such views in detail is beyond the scope of this paper, but it suffices to note that these are at odds with biosemiotics in general, as they suppose a clear cut between the confined organism as subject and its "external" environment (see Rupert 2010: 346), and especially with Marais's (2019, 2023) translation theory. Following Marais, biosemiotics offers a particularly salient approach to technology by construing emergence as translation. This prism lends itself to the study of technology, as technology is generally investigated in light of causes and effects of emergence (Kapp 2018[1877]).

If language is a technology, then interlinguistic translation is technological mediation. Moreover, we claim that any kind of translation, independently of language, is (a form of) technological mediation. This premise enables important insights on machine translation.

The ongoing digitalization of human societies reveals as much, ushering in the perspective that "the history of our tool use, even prior to the advent of AI, is literally a process of mind design" (Clowes *et al*. 2021b: 17). Language is part of this history, an important scaffolding structure. Here, we unfurl the following: (1) the implications for *translation* of this notion of *mind*, not just as extensive, but

mutual with *technology* (as tool use); and, more specifically, (2) the implications for construing *translation technologies* in light of this notion of *(mind-)technology*. We find that a broad semiotic concept of translation – as explicitly developed by Marais (2019, 2023) though first initiated by Elleström's (2018, 2019) approach to intermediality – is necessary for understanding the human–computer contingencies of translation technologies. Specifically, by construing communication as transfer, far from falling into mechanical (or informational) reductionism, Elleström's (2018) semiotic model can nest a theory of sociocultural emergence. Marais (2023) contends that to avoid reductionism and vitalism, social and cultural phenomena must be construed, first and foremost, as also transfers of energy. As such, Marais's proposal is that transfers that involve semiosis are *translations.* In this conceptualization, 'translation' is a broad term that accounts for both the emergence of biological organisms from inorganic (abiotic) matter as well as of sociocultural (supra)subjectivities through natural evolution, without presupposing ontological leaps which would require metaphysical suppositions about (ontological levels of) "reality".

On this account, any instances of language use are subcases of translation. To establish a process theory of meaning as translation, Marais (2019, 2023) directly contradicts a long history of linguistics by following Whitehead (1978[1929]) in that process and form are inseparable. Arguably, several branches of semiotics that have been critical of the double articulation hypothesis coined by Martinet (1962) and building upon Saussure (1959[1916]) work towards this claim (Olteanu 2021b). In establishing biosemiotics, Sebeok (1986) contested language-centrism by claiming that language is a modelling system that predates phonetic articulation. In a social semiotic vein, the multimodal analysis of discourse was later developed starting from a criticism of the double articulation hypothesis and its origin in the dichotomy of form and content (Kress, Leeuwen 2001). Marais's theory eschews the long-enduring supposition in translation studies – even expressed from a semiotic perspective (e.g. in Jakobson 2004[1959]; Nida 1964; Holmes 2004; Toury 1995) – that translation always involves language, either as source or target. His process view on translation is aligned with the plethora of externalist theories of mind (see Menary 2010a), which enable the Mind–Technology Thesis (Clowes *et al*. 2021a) that mind and technology are continuous and mutual.

This line of thought is enabled by Elleström's (2018) cognitive semiotic interrogation of mediality, which embraces Marshall McLuhan's (1994[1964]) classic concept of medium as *extension*, while critically updating it with a contemporary cognitive view. As a medium consists in intermediating processes, Elleström (2018: 281) defined "media products as 'extensions of mind' in the

context of communication". More pointedly, Marais (2023: 45) brings the notion of 'meaning' to the attention of externalist views on mind, advocating the salience of semiotic theory in these: "Meanings are material relations in extended brains, in interaction with the environment or what is external to the brain."

Implicit in his model of communication, Elleström's (2014) theory also offers an important insight for modelling, which opens up possibilities to think of the digitalization of humanities research in terms of translation (Ciula, Eide 2016; Olteanu, Ciula 2023). Defining medium as "the intermediate stage of communication", Elleström (2018: 270) implied that a *model* is a *media product*, which "enables the transfer of cognitive import" from one mind to another (Elleström 2018: 281). This further implies that models are produced through the modal affordances of the minds involved. In brief, modelling supposes transmediation, as it is, in a biosemiotic view, a transfer from one umwelt to another (Kull, Torop 2011[2003]). This idea, albeit not (necessarily) relying on biosemiotic scholarship, has been usefully explicated to address digitalization as semiotic modelling (Eide 2015; Ciula, Eide 2016; Ciula *et al*. 2023; Olteanu, Ciula 2023). In a biosemiotic consideration, Jesper Hoffmeyer (2018: 5) noted that "[t]he only reason why we can so easily retrieve any thinkable piece of information is that Google", or some other modelling technology, "has digitised it". The point is that all information is modelled (mediatized), which means that it is not semiotically neutral.

To presuppose "raw data" as information that does not require modelling or mediation is one expression of the *myth of the given* (Sellars 1956) – metaphysically supposing different ontological kinds within reality, as corresponding to different kinds of data. Interaction with digital technologies may give a false impression of "pure data" or non-semiotic information because their work is to organize data consisting in digital bits algorithmically. Thus, users may be misled to construe the outputs of computing machines as factual information consisting in *data*. This misconception ignores the fact that the data computers work with are semiotic models of human environments that have been translated into binary code, further re-modelled by a mechanic system that does not incorporate *aboutness* (what the data is about) or organismic valuing (normativity). In short: the output of this process makes sense for the (human) user in very different ways than for the processing machine (Esposito 2022: 27; Manovich 2013). It is important to recognize that digital bits (0s and 1s) are themselves symbolic tokens/sign vehicles, which, unlike iconic or indexical signs, contain no (intrinsic) clues to their reference in their sign vehicles, as they are not linked by shared form or isomorphism (icon), nor are they physically/contiguously correlated (index) (see Deacon *et al*. 2018). As such, we say with Terrence Deacon (2022, 2024) that

symbolic modes of reference are ungrounded/displaced and *doubly conventional*: as once the symbolic sign-vehicle is ungrounded, at the level of the sign-vehicle it will be necessary to have a corresponding shared interpretive social habit that can agree on what the displaced symbolic tokens mean/refer to. The symbolic data that LLMs are trained on come pre-interpreted by human culture – themselves already displaced semiotic artefacts. The AI does not contribute to producing shared interpretative habits, Deacon's second level of conventionality.

In digital humanities, where the concern is the digital translation of cultural objects, models are pragmatically conceived as iconic transmediations (Ciula, Eide 2016), wherein similarities are maintained (or not) according to the affordances of the media involved (Campbell *et al*. 2019). In this view, computer processing must output a model that human users perceive as iconic to the input object/model, which in some cases may be an analogue production of the human mind, through the mediality of human imagination. The computer, however, has no awareness of this underlying (grounded) iconicity nor of how this iconicity can become correlated (indexically) with some external referent. Human imagination is a mediality altogether different than the algorithmic workings of electronic computation, while the latter is, nevertheless, *neuro-compatible* (Malafouris 2008; more below). Machine computation works, indeed, iconically and indexically, but with a different sign system than its users. Users (have to) retrieve/discover iconicity between input and output in *contingency*, to use Esposito's (2022) term, with electronic computation that is not *intrinsic* to it. Though language uses media products, as language is a modelling system, it is incorrect to suppose that language presents "raw data", or the highest degree of semiotic neutrality that humans can aspire to. Rejecting that outdated positivist stance is a starting principle for our argument, serving to reflect on translation technologies from the perspective that *all modelling processes are inherently transmedial.* In brief, for language technologies to be of any use, the language data produced by machines must be re-contextualized by language users (humans in social context).

Language technologies in semiotic contingencies

Our view that language is a technology is aligned with Sergio Torres-Martínez's (2024b) recent definition of language as "a cognitive tool for the optimization of biological fitness" and its implication that machine language technologies fail to model environments because they lack embodied grounding (situatedness). If language is technology, language technologies work with technological artefacts that are themselves products of a linguistic medium, commonly termed

'utterances'. Biosemiotics dislocates the notion of 'utterance' from language, construing it as a relational building block of umwelten through genres, in any modality, as a meaningful structure addressed to an *other* (Olteanu, Ongstad 2024: 525; Ongstad 2022). As such, language products are a specific case of *uttering*. Thus, to reflect on how human–machine interfacing through language extends minds and shapes umwelten, we consider how human uttering is enhanced by machines. We note that, as software engineered without regard for underlying kinetic properties, language technologies cannot construct umwelten on their own – unlike robots which *may* do so, albeit without possessing capacities for inner reflection, being unaware of their situatedness (Emmeche 2001). Emmeche's (2001) argument that robots construct umwelten in the absence of inner reflection parallels Pütz and Esposito's (2024) argument that recent LLMs are impressively able to perform linguistically because they can generate text without understanding what it (numbers, letters, words, sequences) extrinsically means, in terms of the conventionally negotiated meanings of human discourse. Despite being trained on human symbolic discourse, Deacon[5] reminds us that LLMs do not in fact possess the competence to interpret, think and act symbolically. Rather, they function through a "system-intrinsic" process of iconically (isomorphically) and indexically (correlationally) combining and recombining symbolic tokens – themselves *traces* left over from symbolic discourse.

In this conception, language technologies are powerful means for extending cognition. The main tenet of externalist theories – that mind does not simply begin and end where a non-mind area of reality begins and ends (Clark, Chalmers 1998) – implies that technology cannot be said to begin and/or end in a specific place, such as where *in silico* processes start or where semiconductor materials participate in computing (Clowes *et al*. 2021b; Theiner 2021). A prime example of language technology is the action of speaking, which is instrumental in human evolution, ontogeny and phylogeny. We expect other language technologies to have similarly transformative potential. If humans do not expect language technologies such as *speaking* and *writing* to be "intelligent" on their own, but rather to enhance thinking in contingency with humans, why should they expect other language technologies, such as those supported by electronic computation and machine learning algorithms, to be intelligent? Since intelligence is located in the speaker, not in language, why is there popular, commercial and even academic dissatisfaction with any (computerized) language technology that does not perform well at simulating a human interlocutor? Our claim is that this expectancy is misplaced (see Kaufman, Roli 2021; cf. Campbell *et al*. 2019).

---

5 Personal correspondence with Cary Campbell (Nov. 2024).

Language technologies can be employed by semiotic agents to generate new semiotic resources, helping to delegate and even offload tasks from the cognitive capacity of organisms onto some external computational capacity. This work engages the imagination of organisms, so as adequately to construe the technology itself. Expecting a language technology, such as LLMs, to act like a human interlocutor, not only leads to disappointment, but also limits the potential of the technologies' computation to be co-opted and further catalyzed by human cognition. To give an example that scholars are all too accustomed to by now: ChatGPT can be used to improve a paper impressively, but it can also produce utterly idiotic texts. It comes down to (mis)use.

To elucidate our theory through an example, one of the authors of this paper, who does not speak (Mandarin) Chinese, encountered a bilingual announcement in a restaurant in Shanghai, informing speakers of English in Chinese and English to "Take meal mouth" (see Fig. 1).

Figure 1. Take meal mouth: A plaque in a restaurant in Shanghai, September 2024. (Photo: Alin Olteanu.)

Inferring that it was the result of machine translation – that failed to identify idioms, as well as (verb) modality and intention – the author understood without much effort that this announcement indicated the counter for *takeaway* food. The translation technology, we contend, did nothing "wrong" here, not any more so than image recognition systems do when recognizing faces of cats in content where there might not be any cat (Esposito 2022: 28; Betancourt 2024). While we can easily think of more fortunate translations in this case, the (human) user should and could *interpret* the utterance, despite its deviance from standard English.

Any translation, even one that perfectly corresponds to supposed norms of grammar and eloquence, requires processing by a semiotic agent, namely one

that can misinterpret it. We agree with the foundational principle of Umberto Eco's (1976: 7) semiotic theory, that what cannot be used to lie cannot be used to tell the truth either, "it cannot in fact be used 'to tell' at all". In this sense, the foundational criterion of semiosis is not the intentionality of deception/lying but rather fallibility – the possibility of making a mistake. In the consideration of technology, Paolucci's (2021) cognitive uptake of Eco's semiotics is particularly useful. Here, the theory of the lie is understood in the optics that "cognition does not serve to represent the world, but to effectively act in it" (Paolucci 2021: 4). As such, semiotic agents are understood to act as enabled by the capacity to entertain possible worlds, abductively informed of what *may* be. In agreement with this, Ahti-Veikko Pietarinen and Majid Beni (2021: 501) argue that Peirce's theory of inference is aligned with the main tenet of the cognitive theory implied by the Free Energy Principle (Friston *et al.* 2016) that "organisms are in the business of finding evidence for their own existence, not necessarily *in actu* but also in terms of what could, would or might constitute such evidence in the future states of affairs" (Pietarinen, Beni 2021: 506). Such modal thinking, which must be precluded by the capacity to lie and probabilistically to assess factuality by entertaining multiple possibilities, is exactly what LLMs fail at (Torres-Martínez 2024a). For this reason, we find Marais's (2019, 2023) Peirce-based translation theory favourable for understanding language technologies.

The expectations that humans should have from (state-of-the-art) translating machines should not exceed the expectations that humans have from language and other technologies through which they utter or, that is, behave. Abstracted from semiotic agents, language is nothing more than *dumb* computing, and so are other (language) technologies. Likewise, abstracted from users and their context, what is language if not a code, a meaningless list of symbolic tokens or labels (lexicon) to be randomly combined through a random system of rules (grammar), which Chomsky in 1968 found rather adequate (see Searle 2002)? In abstraction from biological users that need to "bring forth worlds through meanings" (Paolucci 2021: 4), the output of language technologies is pointless as much as language itself is. We assume that intelligence is located not in the words or utterances of other human speakers, but in how the speakers act with and through these artifacts. Words enable speakers to cognize in ways that would otherwise be impossible (Sebeok 1986; Lass 1990; Reboul 2017). If this is the case, why should we either assume intelligence in the words of a machine or downplay the potential of a machine's language production to change human umwelten? It is the work of situated minds to cognize language instances, whether produced by electronic computing machines or biological organisms. We also ask rhetorically: why should we fear, by default, that computing machines are changing umwelten,

since, at least in hominin evolution and history, umwelten have always been changed (perhaps only) through technologies? Instead of techno-skepticism (or optimism) – which is often little more than mere anxiety towards novelty, unaccepting the truth that reality itself is process – philosophical and scientific inquiry should be concerned with *the ways in which* we agentively perform this environmental change through digital technologies.

The human species can learn to use digital computing technologies in analogy to how it learned to use language, and was indeed transformed by doing so, profiting from an exceptional opportunity in hominin evolution (Sebeok 1986; Lass 1990; Reboul 2017; Olteanu, Stables 2018). If humans exapted language into verbal communication and then adapted *to* linguistic social communication as a species, they can do the same with other (language) technologies. Of course, each new (language) technology presents new challenges and dangers. Print and broadcasting, for example, alongside many positive changes, have also enabled exclusivist collective imaginaries (e.g. nationalism) and colonial ideologies rooted in hate (Campbell, Olteanu 2024). The greatest, but not the only, challenge AI brings has to do with unintelligibility – the fact that this machine computation spirals out endless inferences and iterations, beyond the humans' capacity to follow. At the same time, this was the unavoidable cost of making digital computing machines that, by scaffolding data by themselves, have become communication partners of humans (Esposito 2022: 4).

Misplaced expectations towards language technologies: glottocentrism

The European Commission's (2024) digital development programme states that language technologies "enable machines [...] to bridge the divide between human communication and machine understanding".[6] This is a misleading expectation not only because of the questionable logic that machines enable machines to relate to non-machines, which arguably displays the general difficulty with conceptualizing (language) technologies. We find this misleading because machines produce *understanding* only in contingency with humans (Esposito 2022). There is no divide to bridge. That supposed *divide*, we agree with Esposito (2022: 4), "is not a liability but instead is the very root of the success of these technologies". We find two connected fallacies to underpin statements such as the European Commission's, namely (1) that human languages and machines represent distinct

[6] European Commission 2024. *Language Technologies*. Available at: https://digital-strategy.ec.europa.eu/en/policies/language-technologies. Accessed 30 October, 2024.

ontologies (vitalism), and (2) that human understanding takes place mainly, if not exclusively, in language (glottocentrism). Either of these carry imaginaries that equate intelligence and most forms of learning with linguistic competence, implying that intelligent beings are linguistic interlocutors.

The misplaced expectation about the capacity of language technologies to simulate a semiotic interlocutor stems from confusing linguistic modelling with inferencing. We observe a tendency, particularly in engineering but also in society broadly, to equate *intelligence* with *language competences*. This is the old language-centric fallacy of linguistics and analytic philosophy, stemming from humanism and sedimented by the linguistic turn (Wittgenstein 1986[1953]; Chomsky 2006[1968]; Rorty 1980; Searle 2002), which the study of meaning and language itself has begun to overcome (Boehm, Mitchell 2009; Leeuwen 2008). Unsurprisingly, semiotics champions the criticism of language-centrism (henceforth 'glottocentrism'; see Petrilli 2014; Cobley 2016; Olteanu 2019), also in regard to translation (Marais 2019, 2023). Several areas of language studies, such as applied linguistics, are managing properly to eschew glottocentrism. It is particularly through education, that is ideologically designed, that language acquisition has been historically confused with learning, and language competences with knowledge or, in a politically motivated way, with literacy, as competences enabling the exercise of civil rights and freedoms (Campbell, Olteanu 2024; Lacković, Olteanu 2024). While our methods differ considerably, we agree with Pierre Bourdieu's (2010[1984]) classic study contending that cultural capital is encoded through education. Codes are effective means to maintain social classes. As also demonstrated by William Labov's (1972) studies on Black English Vernacular, schooling is highly effective at maintaining domination and discrimination by confusing *capacities to infer and argue* with *style*.

Regarding language technologies, the confusion may thicken due to misplaced popular expectations about AI. While such technologies are indeed profoundly changing humanity globally, we contend that the term 'artificial intelligence' is misleading. Engineered to replicate the grammar of human societies without engaging in innovating according to situatedness and motivation, language technologies and translation machines sediment so-called standard versions of languages, including (British/American English) monolingualism, as '*intelligence*'. Notably, one way in which AI technologies exert old colonial power structures is through the marginalization of languages that produce comparatively small amounts of digital data (Bender *et al.* 2021; Choudhury 2023). The problem is not just that languages of limited circulation have become even more eclipsed in digital mediascapes but that, engineered through a glottocentric ideology, digital language technologies sediment the rigid grammar of supposedly "correct" or

"proper" speech of educationally established forms of cultural capital. We find an invaluable point in Esposito's (2022; see also Pütz, Esposito 2024) argument that such technologies would be more aptly termed 'artificial communication', as what is *intelligent* about their computation emerges in contingency with agents that *can be deceived.* Relatedly, Deacon[7] has recently advocated the term 'Simulated Intelligence' instead of AI.

While we find hardly anything *intelligent* or *artificial* about these technologies, we would not want to downplay their importance and impact either. On the contrary, the use of powerful computing technologies, sorting large amounts of data in digital form and driven by self-learning algorithms is a major development in the world's becoming, in Peirce's anticipation of a *transhumanist* concept of evolution, "an absolutely perfect, rational, and symmetrical system, in which mind is at last crystallized in the infinitely distant future" (CP 6.33). Herein lies the cornerstone of our argument on translation technologies: as Marais (2019, 2023) builds on Peirce's theory, *translation* is a concept to explain emergence, the crux of a continuist (or what Peirce called Synechist) evolution theory. For the most part, we agree with Steve Fuller (2022) who has observed not only that Peirce's concept of continuity was instrumental for the intellectual history of *evolution theory*, but it can also support a transhumanist (and neo-Darwinian) view of evolution as unfolding scaffolded not only by the past, as path dependencies, but also by possible futures. Fuller (2022: 247) observes that "a pastiche of the mid-eighteenth century European imagination updated for today" badly affects the most prominent contemporary theories of mind and implicit notions of computation, intelligence, and technology (e.g. Rorty 1980, 2004; Searle 1990a, 1990b; Floridi 2014; Dreyfus, Dreyfus 1986). We sympathize with this bold claim eschewing concepts of consciousness as well as intention, understood as high-level cognition from construals of mind (a claim we find that Peirce would have also subscribed to). Rather, in agreement with contemporary views in evolution and cognition (Reboul 2017), as particularly championed in biosemiotics (Hoffmeyer, Stjernfelt 2016), Peirce found *final causation* instead of *consciousness* to be a basic principle, thus observing the presence of mind-work in matter:

> The psychologists say that consciousness is the essential attribute of mind; and that purpose is only a special modification. I hold that purpose, or rather, final causation, of which purpose is the conscious modification, is the essential subject of psychologists' own studies; and that consciousness is a special, and not a universal, accompaniment of mind. (CP 7.366)

[7] Personal correspondence with Cary Campbell (Nov. 2024).

It is not only unfounded conceptualizations of *anthropos* as determined by a (random) event in the long distant past, such as the emergence of the bipedal ape, as supposed by Carolus Linnaeus (1759),[8] that obstructs a trans- or at least non-humanistic view of evolution (Fuller 2022: 247, 251). Glottocentrism is another such obstruction; deeply ideological, it is perpetrated by its implementations in AI language technologies. With the aim of developing a transhumanist conception, Fuller does not address glottocentrism specifically, while it is currently one of the main concerns in (bio)semiotic theory (Petrilli 2014; Cobley 2016; Petrilli, Ponzio 2024), as exhibited by Marais's (2019, 2023) notion of translation as emergence. Evolutionarily, the possibility of phonetic articulation emerged in apes in the condition of uprightness (bipedalism). Linguistics has long confused phonetic articulation with language because of the deep entanglements of glottocentrism and anthropocentrism in Western modern thought. It is also within this anthropocentric humanism that the ideological concept of 'Nature' was conceived, particularly sedimented in Romanticism (Wulf 2015), as opposed not to the meanings and connotations of 'unnatural', but to the human production of artefacts.

Technologies that the AI brand refers to are not artificial because they are computing technologies and computation is too common a process throughout reality (Magnani 2021) to be labelled 'artificial', whatever 'non-artificial' or 'natural' may mean. It is misleading to think of these technologies as "intelligent" because the term 'intelligence' is misleading in general (Esposito 2022), culturally peculiar and psychologically controversial. Particularly, in regard to language and translation, these technologies display most clearly their failure to perform the all-too-human, if not all-too-biological, characteristic of acting and communicating modally (Pietarinen, Beni 2021), through conditional inferences as simulations of possible or, more specifically, *probable* worlds. For example, Torres-Martínez (2024a) observes that LLMs fail to grapple with modal verbs. Language, as a type of modelling practised by humans that must construct environments to survive, proceeds "in anticipation of imprecisely imagined futures", which are "remapped after each incremental act as speakers constantly respond to and evaluated their ongoing production" (O'Grady, Bartlett 2023: 227).

Additionally, LLMs flatten the embodied and physiological aspects of language and communication – the fact that learning and speaking are embodied experience, which is the *locus* of grammar construction. Language technologies relying on machine learning are extremely proficient at remapping, which is

[8] Linnaeus, Carolus 1759. *System of Nature* was accessed at https://www.biodiversitylibrary.org/item/10277#page/3/mode/1up on 1 December 2025.

possibly what fuelled much enthusiasm, but expecting them to *act according to imprecisely imagined futures* (simulate this) is misplaced. To interpret or to use *anything that can be used at all* requires imprecision or, better put, *indeterminacy*. Indeterminacy is what human users (or other organisms) must bring in contingency with machine computation to make the computation meaningful and, as such, involve it in the scaffolding of (more complex) umwelten. From the animal (human) perspective, the only purpose of co-opting mechanic computation in its cognition (Magnani 2021) is to acquire more semiotic freedom, usually through enhancing cognitive capacity. This means re-contextualizing and re-correlating precise machinic outputs with the messiness and indeterminacy of human discourse:

> Through big data, algorithms "feed" on the differences generated (consciously or unconsciously) by [human] individuals and their behavior to produce new, surprising, and potentially instructive information. Algorithmic processes start from the intelligence and unpredictability (from the contingency) of users to rework them and operate intelligently as communication partners, with no need to be intelligent themselves. (Esposito 2022: xii)

The misnomer 'artificial intelligence' endures in academia because of its commercial success, due to long-lasting sociotechnical (sci-fi) imaginaries as displayed in a range stretching from ancient myths like that of Pygmalion and Galatea to novels such as Mary Shelley's *Frankenstein* (1818), movies like *Metropolis* (1927), and the more recent *cyberpunk* genre. Language technology manufacturers, examplified, for instance, by the name *Open AI*, are eager to exploit this brand. Perhaps most tellingly, technologies that promise intimate partnership and/or companionship are mainly LLMs – as if linguistic conversation is all that is required for partnership. The software *Replika*, advertised as the "AI companion who cares",[9] does not have much more to offer than an LLM.

We are not concerned here with ethical questions regarding intimacy with non-organic entities. We merely note the equivocation in the development of these technologies, of features of *intelligence*, such as *care*, with language competences. Developers (and probably users) do not seem to pay much attention to other modalities – for instance, how touching or smelling shape partnership and relation. Nonverbal modelling and communication are construed aside from the domain of 'intelligence'. Without even fully tackling the lofty and vague concept of 'intelligence', we can observe that AI interfacing with humans is being reduced to linguistic competences. This is not new. Developed in this way,

[9] See https://replika.com/.

language technologies are perpetuating the glottocentrism that modern Western educational ideology carries through the advent of modern literacy in association with compulsory schooling, purported by the Enlightenment and strongly advocated through Romanticism (Olteanu, Campbell 2023a, 2023b; Campbell, Olteanu 2024).

Engineering efforts seem to be driven by popular disappointment at the fact that AIs are not satisfactorily humanlike in their linguistic performance. The *Replika* app is inspired by imaginaries such as those underpinning Spike Jonze's film *Her* (2013), in which the protagonist falls in love with a language AI that is a disembodied voice. Our concern here is not the issue of humanlike AI and the desire underpinned by anthropocentric imaginaries, as displayed, for example, in the ancient myth of Pygmalion. What we criticize is the misplaced desire to develop technologies that communicate linguistically like humans. In brief, misplaced expectations that the misnomer 'artificial intelligence' produces in conjunction with historically deep-seated glottocentrism lead to dissatisfaction with underlying language technologies, as well as powerfully computing technologies in general.

AIs appear, so to say, "dumb" because they fail to perform speech acts in the conditionally imagined futures that drive the construction of environments of organic subjective agents (Pietarinen, Beni 2021; O'Grady, Bartlett 2023). They fail to do so indeed, but we draw attention to the fact that dissatisfaction in this regard may constrain the imagination from exploiting these technologies to their full capacity and to their users' benefit. Rather, in contingency, humans (and, possibly, other animals) may co-opt AI into their active inferencing (see Pietarinen, Beni 2021; Olteanu, Romanini 2022; on *active cognition* see Friston *et al*. 2016), to discover new possibilities through a greater expanse of hypothesizing, one that is not possible for human cognition unaided by such computational capacity. It is particularly this imaginative competence that, we argue, should be studied and implemented educationally as *AI literacy*, or rather, *artificial communication* or *LLM literacy*. Language technologies can be used at their best potential when their processing is interpreted conditionally, through humans' imprecisely imagined futures. Hence, we advocate the need for a semiotic investigation of AI technologies, of how they become parts of subjective worlds, without reference to a specific species' modelling system, such as language. That is, we see the need for exploring what these new technologies can actually do with and for their users. What are the possible *exaptations* (Gould, Vrba 1982; Lass 1990) useful for the transformation of umwelten? While of particular importance, this question goes beyond the scope of the present paper. Here, we offer only a limited contribution in regard to interpreting and contingently making use of machine translations.

Translation is technological mediation

The first point of our twofold argument that translation is technological mediation is addressed by analytically employing the concept of 'technology' through Marais's (2019) biosemiotic theory of translation. While a greater epistemological argument on emergence is at stake in Marais (2019, 2023), one of the justifications for detaching translation from linguistics and nesting it, instead, in a broad and multimodal semiotic framework stands in the social implications of recent developments in computation technologies (Marais 2019: 22–23). We observe an opportunity at this historical juncture saturated with the rapid technological transformation of AI to define technology through Marais's semiotic translation theory. By thinking of translation through an externalist account of mind (see Menary 2010a; Theiner 2021), what translation theory traditionally defined as sources and targets are rather construed as artefacts emerging throughout processes (Marais 2023: 7). Employing Elleström's (2018) media theory to reflect on modelling (see Ciula *et al.* 2023: 95–96), technologies and artefacts can be seen to parallel *media products* and, *cognitive import*, respectively. Cognitive imports are media products, the production of which involves cognitive processing. To give an example, an idiolect or a genre is a technology (media product) that allows for the production of an utterance (cognitive import), as an artefact.

Marais (2019: 4) explains that biosemiotics implies a process approach (Whitehead 1978[1929]) to translation, arguably latent in Peirce through his later articulations of semiosis (after 1890). Artefacts are emerging entities within and along translation processes that can be identified as "traces of the processes that created them" (Marais 2023: 7). In this view, translation is not about a stable product or content in a source or target system (e.g. that English 'dog' means French '*chien*'), let alone the supposed equivalence of the two (Olteanu 2021b). The production of artefacts (uttering) continuously changes technologies (genres), just as it changes umwelten (Olteanu, Ongstad 2024).[10] Humans change language because they speak it. As machines produce texts, interlinguistic translations and, contingently, conversations with humans, they change language, too. Marais's biosemiotic notion of translation can find support in Paolucci's (2021) cognitive semiotic theory that reads Peirce's pragmatism in light of recent enactivism (Gallagher 2005) and material engagement theory (Malafouris 2013). As processes, translations have trajectories (or directions) and, as traces, artefacts are located within trajectories. Fitting with Elleström's (2018) communication model, the externalist view of cognitive semiotics posits that this trajectory occurs

[10] We contend that artefacts are processes, but minds abstractly objectify them into synchronicity (or as non-chronic) to handle them in modelling processes.

between two minds, one of which is located in the future, where an interpretant is being projected and anticipated. For Marais (2019: 4, 67, 78), *translation* is the process, involving at least two systems, of creating interpretants. In brief, translations are dialogical processes, either as part of one agent's becoming (autopoiesis) or between several agents.

To define translation as delimited by a source and a target is as incorrect as to suppose a beginning and end to semiosis. In this view, we define 'technology' as a *semiotic system that hosts what a semiotic agent identifies as potential semiotic resources through an interfacing of systems.* For example, in the flow of experience a subject may conceptualize a part of its surroundings as a 'chair' – a cultural object that affords sitting down. Interfacing with the same surroundings but having a different intention, the subject may take the same part of the surroundings to be a 'stair' or a 'weapon'. In this process of conceptualizing, the motivated subject discovers different affordances/constraints – which are semiotic resources (see Campbell *et al.* 2019). As "meaning is a continuous, never-ending process of creating relationships between representamens, objects and interpretants" (Marais 2019: 126), a discovered semiotic resource has the role of interpretant (e.g. "Stair!") in this process, becoming at a time representamen and object by being used (e.g. climbing the stair) to effect change in an umwelt so as to discover new semiotic resources (Marais 2023: 48–49).

If translation is a process of form (Marais 2019: 5), forms that within the process are identified as *objects* can be interpretatively exploited. The context of an interpretable form is itself a technology. For example, if I interpret a sequence of printed symbols to be a dramatic narrative, the human-mustered printing press that produced the set is technology. If I see a face in the clouds, the clouds, as perceptively and cognitively processed by my situated mind, constitute a technology. If I interpret pixels on a computer graphic terminal to represent something other than pixels, then the graphic processing of digital code, with everything that this entails, is the technology employed. Consider, for example, Figs. 2 and 3, below. Fig. 2 is a pixel art reinterpretation by the authors of this paper of Roy Lichtenstein's painting *Girl with Hair Ribbon* (1965), originally executed in magna and oil paint (exhibited at the Museum of Contemporary Art Tokyo[11]). In this reinterpretation, Pixlr Express[12] as used by the authors, involving a laptop with its screen and keyboard, an internet browser and adjacent software, is the *technology*. Reinterpreting the artwork in pixel art, through iterations of compilations in Pixlr Express, can be a limitless process. Echoing Zeno's

[11] See https://mot-collection-search.jp/en/shiryo/4035/.

[12] Can be accessed at https://pixlr.com/express/.

paradoxes, one can ask, when is the processing of that image pixel art *enough*? When should we cease applying effects and *pixelling* an image for it to be pixel art? We took *traces* in the process of translating a pop art painting into digital pixel art as good (or not) enough artefacts for our purpose. We deemed Fig. 2 as one example, among others, to fit the purpose.

Fig. 3 is a Perler art translation of Lichtenstein's same painting. Perler beads, including the use of an ironing machine, is the technology used to produce this content. In both of these examples, the interpretative as well as, more specifically, the artistic work does not end once no additional beads are supplied or when editing techniques are no further applied through image-editing software. The semiotic work continues with every interaction with the artwork, which will continue to be translated into new (im)material forms.

Of course, if the beholder is not familiar with Lichtenstein's painting, these images may stand for something else, e.g. a random person, or a cultural symbol of girlhood, or unspecific pop art. Either way, these are translations, and their every interpretation involves further translation. Our point is that any media product is a technological mediation, one that leads an interpreting mind to its future state. In being interpreted as *a person* or as *The Girl with Hair Ribbon*, a perceived artefact becomes part of an interpreting mind. Another connected point we want to make is that while a specific technology may be identified (e.g. an *electronic computer* or *oil on canvas*), every technology is scaffolded through other technologies (Hoffmeyer 2008a, 2015; Olteanu, Ongstad 2024) by the interpreting mind, with its perceptive affordances. As such, every media product is a form that, within an ongoing process of scaffolding, which we equate with *mind*, is employed as a semiotic resource. The work of *mind* is to extend itself through technology (Clowes *et al*. 2021a). Indeed, *The Girl with Hair Ribbon* is itself a process and we may speculate, without implying plagiarism or claims about lack of authenticity, that it is a *translation* of other artefacts, e.g. Johannes Vermeer's *Girl with Pearl Earring* (c. 1665), as the title of Lichtenstein's artwork may suggest.

Figure 2. Our reinterpretation of Roy Lichtenstein's *Girl with Hair Ribbon* using Pixlr Express.

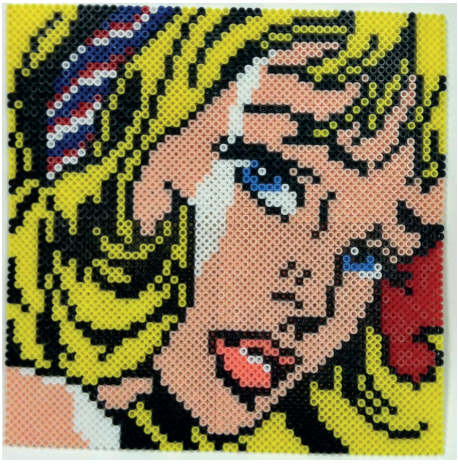

Figure 3. Perler Art: Roy Lichtenstein's *Girl with Hair Ribbon* by thewiredslain (https://www.deviantart.com/thewiredslain/art/Perler-Art-Lichtenstein-s-Girl-with-Hair-Ribbon-288295391; License: Creative Commons Attribution-Non Commercial-ShareAlike 3.0 License).

A semiotic view on translation technologies

In this view, language itself is a technology, a claim proposed also by Daniel Dor (2015), but in a conceptualization different and, in some crucial concerns, contradictory to ours. In our view, *language* is posited posterior to its products: the semiotic employment of, for example, phonemes or words or syntax, reveals the workings of language, as an organizing system (bottom-up). Utterances make up a genre that, in turn, systematically organizes the utterances through a syntax, thus shaping an umwelt (Ongstad 2022; Olteanu, Ongstad 2024). When humans speak (or write), they do not (need to) explicitly give thought to what language

(or some semiotic system) it is they are employing. Like everything organisms do, human language is enactive (Varela *et al*. 1993[1991]).

In a semiotic commitment, Dor (2015) already pioneered the argument that language is a technology and that it should be studied as such. While we agree with and take inspiration from many points in his argumentation, we diverge from Dor's theory in a major regard – namely, by claiming that language is a unique type of technology, one that sets humans apart by enabling unparallelled imaginative capacities, Dor also claims language as an anthropic marker, justifying anthropocentrism. We consider that Dor's misconception stems from following Saussure's (1959; see Dor 2015: 11) view that the purpose of language is communication and, as such, that language is primarily a social, not cognitive, phenomenon. Thus, Dor accepts the Saussurean polarization of form (signifier) and content (signified) to which Marais (2019, 2023) opposes a process theory of translation. With Marais, we advocate the biosemiotic view (Sebeok 1986; Petrilli, Ponzio 2005, 2024; Cobley 2016) that the main role of language is *modelling,* which allowed for its exaptation as a system for communication, eventually transforming it as a collective modelling system of a highly social species. As a very efficient, rich and successful system of intra-individual (exosemiotic) communication, language is a social phenomenon that has channelled the further evolution of humans (and, as such, other animals), having implications for (human) cognition.

Our biosemiotic proposal finds support in extended mind theory, which underpins the *mind–technology continuity hypothesis* (Clowes *et al*. 2021a; Theiner 2021). We note that, so far, work in this vein does not mention semiotics at all, as is the case with much philosophy of mind and philosophy of technology currently. In this view, language is one of the many means by which the mind extends onto new media and modalities. It implies that interpretation and, indeed, thinking involves translation. Biosemiotics demands that endosemiotic and exosemiotic processes, while distinguishable in the consideration of *metabolism* (Th. v. Uexküll *et al*. 1983; cf. Jacob *et al*. 2023), are inseparably intertwined and, therefore, co-evolving. This aligns biosemiotics with philosophy of embodiment in the regard that cognition is situated (embodied, enacted, embedded, extended) and, more specifically, that cognition is perceptive. *Insight* or, simply, *learning* is always based on a transformation between one perceptive modality and another (Olteanu 2021b). Translation processes are implicit to *thinking* because thought is dialogical (Petrilli, Ponzio 2005; CP 4.6, 7.630; Bakhtin 1981). Hence, *thinking* involves translation. For this, communication systems need to be grounded in modelling systems. We agree with Dor's (2015: 25) fundamental claim that language instructs the imagination but argue that so do many other technologies which intervene in the modelling from (direct) perception to conceptualization. This contradicts the

positivist demand on translation to maintain meaning (in the form of unchanged and uninterpreted symbolic tokens/sign-vehicles) while changing from one system of representation to another. Instead of "mistakes", these mismatches in translation can be heuristic and generative. There can be no insight in the absence of translation, only ignorant computation (Magnani 2021), such as knowing subjects can infer taking place in the absence of observing minds. There is no semiotic difference between weather phenomena on a lifeless planet that no living being ever observed and the outputs of LLM in the absence of contingency with a mind. As soon as a mind observes either of these, new complexity levels emerge, so that only then are these processes, contingent upon subjectivity, properly weather phenomena or LLM outputs, respectively.

Moreover, while language, as a technology, instructs the imagination by giving some access to the thoughts of others, we take a moderate position in regard to just how much it is possible to know about other minds, and even one's own. Dor (2015: 1, 51) finds that language is such a unique technology by supposing that it offers access to the intimate thoughts of others, connecting individuals existentially, to a great level of intimacy. We consider it misleading to seek 'what happens' in a mind.

Organisms cannot stop the process of bringing worlds into being through embodied meaning-making (see above; Paolucci 2021: 4) – for example, recognizing a *chair* or evoking the contextual meaning of a word in a language one speaks. Conversely, electronic computing language technologies must go about this the other way around: a system of meaning is supposed (presumed given) to set the rules of the (language) game within which the computer then processes units, as contrasted to discovering them. This recalls the explanation of Varela *et al.* (1993[1991]: 147–157) on the failure of efforts to develop AI, at the time they were writing in the 1980s–90s, which remains salient now. Namely, instead of being immersed in a pool of infinite potential data from which an environment can be enacted, computer programs are fed finite (no matter how large) amounts of data. Before it processes a set of symbolic tokens/characters (a word) such as 'table', a LLM must know whether to process it in what is strictly defined as a language, such as English or French. Of course, language technologies perform well in identifying a language, but they must do so and stick to it for the language processing to be of any use (and, possibly, receive confirmation from the human user, an intervention which is then taken as data). This processing is false to the linguistic phenomenon in humans because, in the latter, rules (syntax) are constructed as language proceeds (e.g. Langacker 1987; Brandt 2020: 65–79; O'Grady, Bartlett 2023), being always heterogenous and unstable (Marais 2023: 143–144).

In social situations, differentiating between a situation of *code switching* and a *creole* is irrelevant. For the processing of a language technology, that differentiation is necessary and, also, not an easy task – requiring access to large quantities of past symbolic data to provide the adequate contextual probability for this symbolic differentiation. Especially in translation, a software needs to "know" if a certain word or idiom belongs to a language as data. For example, the apparently English term '*Handy*' will be translated differently if the source language is English than if the source language is German. In human social situations, a speaker will probably figure out without much effort that a construction such as "Can you give me your Handy?" refers to their smartphone, regardless of the fact that this correlation of '*Handy*' with 'phone' is not derived from English. Echoing Hoffmeyer's (2008b) biosemiotic conceptualization of boundary as membrane, Marais (2019: 32–33) eloquently explains: "Semiosis is what takes place because of and despite boundaries. The boundary is the membrane that is, paradoxically, both open and closed, and, in living organisms, it is traversed by sensations that are interpreted as having meaning."

By implying that language is, in itself, a technology, this semiotic approach allows for understanding language (translation) technologies without assuming ontological leaps between the supposedly human-exclusive domain of language and the (unintelligible) computing of non-organic (abiotic) machines. Rather, as will be explained further, machine interlinguistic translations offer their human users new extended modes of *interfacing* (Galloway 2012; Apperley *et al.* 2016; Lacković *et al.* 2024), which function as scaffolds in the continual process of creating interpretants.

Technology as mind's outworking

Building on the phenomenological theories of Maurice Merleau-Ponty (2010[1945]), regarding cognition, and of Don Ihde (1990[1945]), regarding technology, current philosophy of technology contends that human history can "be viewed as process of the innovation and accretion of new cognitive functions through our deep and interpenetrative relationship with technology" (Clowes *et al.* 2021b: 17). Specifically, this leads to equating *technology* with whatever it is that *minds* do. Mind and technology, in this view, are continuous.

Steve Fuller (2022: 251) succinctly clarifies this trend in philosophy by explaining that "what might be called The Strong Mind–Technology Thesis is that the philosophy of mind and the philosophy of technology are two ways of talking about the same thing, whereby 'technology' is understood to mean the mind's

outworking in nature". This should concern semiotic theory not only because in current humanities and social research (especially education and ed tech), *technology* is broadly becoming a normative epistemologically organizing concept, but that this discussion is *par excellence* semiotic. Indeed, as the Mind–Technology Thesis relies on evolution theory, Fuller (2022: 248) credits Peirce for the key role of enabling "a 'continuist' turn of mind that tends to reduce differences of kind to differences of degree".

Highly important for evolution theory as well as philosophy of technology (Kapp 2018[1877]), Peirce's notion of continuity is also currently of particular relevance for translation theory and technologies. If the difference between human language and computing technologies is one of *kind*, then all language technologies are deemed to *fake* language, always in an unsatisfying way. On this account, they are improperly called 'language technologies' or 'translation technologies', because they could not interact with language as language. While the semiotic systems of electronic computing machines are not the same as those of humans (or other animals), they catalyze each other through contingency (Esposito 2022). They feedforward (Hansen 2015) into each other. Through practices of interfacing (Apperley *et al.* 2016; Hookway 2014; Lacković *et al.* 2024), their computations blend into the others', confusing the boundaries of the organism, as meaning-making becomes increasingly diffused in an expanding umwelt.

What other purpose (in the Peircean sense) can language have if not extending *minds*, cognitively and socially? If this is the purpose of language, then language is decidedly a technology. In brief, language stands in the same relation to mind as those electronic computing technologies that algorithmically process language. Adopting Lambros Malafouris' (2013) material engagement theory, we construe phonemes or visual symbols that make up a language to be as compatible with neuronal activity as electronic computing machines. Just like humans make pots out of clay and powerfully computational machines out of semiconductors because clay and semiconductors are neuro-compatible (Malafouris 2008: 22), humans could extend an internal modelling system into a social communication system by employing phonemes (Sebeok 1986; Lass 1990) because phonemes are neuro-compatible (prior to having other qualities).

The process that makes a machinic translation of language of any use involves not only (1) an instance of language and (2) its computational processing through hardware and software but, importantly, (3) the mind that extends itself through this interfacing, *because* and *despite* of the boundaries between semiotic systems, such as language and the machine's digital coding. Overlooking the situated mind that extends in this technological work implies a construal of machine translation

as lacking what in linguistics is termed 'motivation' as well as, more broadly, what in phenomenology is termed 'intentionality' (Brentano 1973[1874]; see Favareau, Gare 2017) or what Peirce referred to as 'significance' (see CP 5.371, 7.357–361; Short 2006: 6–11, 43).

Thus, we see the need and scope for construing 'translation' and 'technology' co-dependently and find that Peirce's semiotic theory is particularly insightful in this regard. Peirce's semiotics, as thoroughly explained by Marais (2019, 2023), underpins a concept of translation that is not at all dependent upon language. Marais (2019: 15, 102) contrasts the way in which Peirce thought his semiotics to imply a theory of translation as mediation in the most general sense to Jakobson's 1959 uptake of Peirce's semiotics into a (groundbreaking, yet still) glottocentric translation theory (see Jakobson 2004[1959]), directly citing the American pragmatist: "Transuasion (suggesting translation, transaction, transfusion, transcendental, etc.) is mediation, or the modification of firstness and secondness by thirdness, taken apart from the secondness and firstness; or, is being in creating Obsistence" (CP 2.89).

Here, we think of translation as a transfer between two technologies, which means between two systems of the same kind. The technologies do not *exist* or *subsist* prior to the transfer. Following the parity principle of extended mind theory (Clark, Chalmers 1998; see Menary 2010b: 5), we contend that technologies can be posited because of the transfer. To illustrate this, a part of the world is a *hammer* only if for a particular semiotic agent that part of the world can be *hammered* with or, using Peirce's term, if that part of the world is bestowed with hammer significance. Peirce's *being in creating obsistence* are traces in processes, objectified as emerging artifacts, in Marais's (2019, 2023) terms.

While Fuller gives some weight to Peirce's importance for the intellectual history not only of evolution theory, but also of the broader refutation of classical humanism by construing evolution in a way that eschews both vitalism and mechanic reductionism, current philosophy of technology pays little attention, if at all, to this line of pragmatic scholarship, or to semiotics in general. In our reading, Fuller is not interested in construing technology in a semiotic view either. Explaining evolution without vitalism or reductionism has been the crux and driving principle of biosemiotics (see Marais 2109: 48, 2023: 6; Stjernfelt 2007; Hoffmeyer 2014a, 2014b, 2015; Hoffmeyer, Stjernfelt 2016; Olteanu, Campbell 2023a; Campbell, Olteanu 2024), arguably a neo- or post-Peircean project (see Rodríguez Higuera 2019). Also, the Mind–Technology Thesis and Peirce's semiotics share the aim of collapsing mind/matter dualism. The former, which is a century more recent than Peirce's semiotics, does so primarily by supposing a processual continuum whereby mind delegates tasks to technological artifacts

and so extends into the environment (Clowes *et al*. 2021a). In Peirce's case, as Deely (2009; also Olteanu 2021a) eloquently insisted, the concept of 'sign' has the rationale of collapsing the dichotomy of subject and object. Not only do we find these epistemologically compatible, but Peirce explicitly argued that refuting (mind/matter) substance dualism implies accepting that, circumstantially and functionally, non-organic matter can stand in the same relation of causality to mind as brain tissue does (CP 7.366). Rejecting psychologistic explanations of mind, he exemplified this with an inkstand: taking his inkstand away from him, he argued, would impair his faculty of discussion in the same way as having a brain lobe removed (CP 7.366).

The stance that translation is technological mediation is one pathway of pursuing Marais's proposal to conceptualize translation through the Peircean concept of semiosis, which avoids "the idealist philosophy underlying most of linguistic thinking in the 20th century" (Marais 2019: 11). To achieve this in semiotic theory, we argue with Paolucci (2021), it is necessary to construe mind and agency in an externalist view, acknowledging "the active role of the environment in driving cognition" (Clark, Chalmers 1998: 7), a theory foreshadowed in Peirce's semiotics. This aligns semiotic theory with the contemporary and salient conceptualization in philosophy of technology that mind and technology are mutually implicit in a continuous process (Clowes *et al*. 2021a; Fuller 2022).

Further, this perspective invites reflection on translation from the point of view of technological artefacts (such as LLMs and translation technologies) in complementarity with their interfacing organic (human, linguistic animal) counterparts and components. Following Esposito's (2022) rethinking of AI as artificial communication, we think of translation as occurring in the contingency of a present mind with its object of extension. Construing translation as contingency is aligned with Marais's (2019: 20–22, 47) view that translation is defined in relation to supposed target (language/culture) or source. Rather, translation is what the mind does to extend from a present to a future state, in a process of expanding and extending affordances, increasing modelling competences and semiotic freedom. This implies a dialogical concept of mind, as unearthed by Petrilli and Ponzio (2005, 2024), primarily in Peirce (CP 4.6, 7.630; see also Colapietro 1989; Wiley 1994; Andacht, Michel 2005; Raggatt 2010) and Bakhtin (1981). From this perspective, any process that involves language is a subcase of translation. We remark that, as our argumentation points to the confusion surrounding the term 'artificial', it also opens a door to construe mind– technology continuity without using the opposing term, namely 'nature' (or 'natural'), which Fuller (2022) finds necessary. Technology is, indeed, the *outworking* of mind, and

not only do we give Fuller credit for this formulation, but consider that his specific term, 'outworking', opens new horizons for philosophy of mind and technology. However, following Peirce, we see that the outworking of mind does not need to be directed to nature, whatever 'nature' may be. Rather, mind outworks towards its future state. This is implied by Peirce's concept of 'aboutness' as 'significance'. Following Peirce's concept of pragmatism that "the intellectual significance of all thought ultimately lies in its effect upon our actions" leads to conceiving that "rationality of thought lies in its reference to a possible future" (CP 7.361). Simply, as perception is inferential, which means enactive (Paolucci 2021), inference can only be predictive (e.g. CP 2.96).

To relate this to translation, Marais (2019: 7) noted that "translation studies that focus on interlingual translation are not able to account for new developments in technology", which are currently reshaping human societies, together with their hermeneutic habits, among which language itself is part and parcel. If language is not a technology, then any human–computer interaction that involves language cannot be anything but a pretense, a *simulacrum*. In this view, if technologies are not compatible with a (human) mind's existing modelling systems, neither can they properly extend (human) minds. To construe language as anything but technology is to undermine from the start the possibility of the environment having an active role in an agent's *thinking* and in its constitution as a (semiotic) agent. If the work of mind is to expand an umwelt, thus acquiring greater semiotic freedom, then language is one successful strategy of doing so. Language is one technology among many.

Through this prism, a semiotic notion of translation may be put to use in brokering technological emergence. Namely, technologies are what transpires as the context of artefacts in translation trajectories. As such, technologies can also be conceived of as genres (Ongstad, Olteanu 2024). This involves (1) that translation is general semiosic work of transferring cognitive input (following Marais 2019, 2023 and Elleström 2018), not bound to language, and (2) that language is a technology. If the idea of *translation*, as well as the need for a theory, first arose from the need to translate interlinguistically, it does not mean that translation always involves language (or culture). Rather, it proves that language is a technology, since it is at the interfaces of technologies, or media (McLuhan 1994[1964]; in this case, languages) that what is ubiquitous in a technology becomes perceivable. The glottocentric notion of translation, enduring in academia, is intertwined with imaginaries fuelled by specific technologies, particularly the printing press, which have largely equated social representation with *writing* and writing with *transcribing* (Petrilli 2014; Marais 2019: 7; Campbell, Olteanu 2024; Lacković *et al*. 2024).

Glottocentric notions of translation play a role in maintaining idealism and substance dualism in semiotic theories (Marais 2019; Deely 2009). While in the currently ongoing digital revolution the humanities and social sciences are centring on *technology*, semiotics lags in developing its own systematic approach to technology. The fault for this is the malign form of substance dualism subsisting in much semiotic theory often employed for cultural critique. To overcome this, we see the need of closing the gap in semiotic theory between *representation* and *enaction* (Campbell, Olteanu 2023b), a pathway that Paolucci (2021) has recently made explicit. Some colleagues involved with the semiotic analysis of culture may disagree, but we side with Marais's (2019: 11) criticism that "translation studies share the idealist bias of cultural studies, by being more interested in representations of reality than in reality itself".

On the one hand, it is surprising that, some exceptional studies coming from specific angles notwithstanding (Emmeche 2001; De Souza 2005; Hartley, Herman-Pillath 2019; Hartley *et al*. 2021), semiotics lags in informing academic discourses on technology. Freed from glottocentrism, semiotic theories have much to contribute to the interrogation of technology in respect to meaning making. 'Technology' is a thoroughly semiotic concept, as technology is something interpreted as such. Technology is what semiotic agents use technologically, that is, a specific exploitation of a semiotic resource, itself a possible embodied affordance (Campbell *et al*. 2019): a hammer is a hammer if a semiotic agent knows to use it as such. A laptop can be a powerful digital computing machine, a food tray or a weapon, among many other things, according to how a semiotic agent is able to discover and make use of affordances. Employing a term from Uexküll (2010[1934]: 140), a technological artefact is something on which a semiotic agent bestows a *tone*, so as to have a certain function within an umwelt. One way in which Uexküll exemplified 'tone' was by noting that, as part of a road, a stone has a path-tone, but it can beget a weapon-tone if a passerby uses it to defend herself from an attacking dog. In this line of thought, we find that semiotics aligns with and can complement how externalist mind theories and (post)phenomenology relate to technology. Parts of the world become technological artefacts by being bestowed with a tone in some umwelten, which thus change.

On the other hand, it is understandable why a systemic semiotic theory of technology is lacking, given lingering humanist conceptualizations in semiotics, particularly as a theory of culture (e.g. Lotman 1990; Eco 1976) and the centrality of language therein. While semiotics has been recently employed in tackling some emerging digital technologies (Hartley, Herrmann-Pillath 2019; Hartley *et al*. 2021; Bankov 2022; Kozicki 2023; Fawzy, ElSamadoni 2024), especially in discussions on new media literacies (Campbell, Olteanu 2024; Lacković,

Olteanu 2024), a thorough semiotic concept of technology is missing and, overall, academic semiotic discourses stand out by ignoring the greater trend towards science and technology studies in the humanities and social sciences. We consider that this trend should not be avoided but embraced and critically engaged with. For this, semiotics (as well as linguistics) needs to shake off the heritage from its deep humanist intellectual history, and embrace prospects towards which it, interestingly, has already corroborated, such as post- and trans-humanism (e.g. Floridi 2014; Fuller 2022) and, perhaps most originally, antihumanism (Cobley 2016: 45–56, 57).

Conclusion

In an interrogation of translation, we have pointed out some avenues in which semiotic theory can be used to conceptualize technology and technological interactions. The crux of our argument is that machine translation is no different in *kind* from inter-human (inter)linguistic translation. Semiotic theory is useful here because of the broad sense in which it construes translation as a phenomenon independent of language (Petrilli 2014; O'Halloran *et al*. 2016; Olteanu 2021b; Marais 2019: 15–16).

Underpinned both by narrow concepts of 'technology' and of 'translation', machine translation and Human–Machine Interaction (see Ernst, Schröter 2021: 20) are commonly approached through the assumption that human language is an ontology of its own, altogether distinct from technology, even defining the full scope of human interpretive possibilities. In that view, translation always involves a (human) language, either as source or target. It restricts translation studies to a narrow scope, as inherited from humanism, where language is construed as an anthropic marker, setting humans aside from the animal realm, if not from the biosphere entirely (Petrilli, Ponzio 2005; Cobley 2016). This classic perspective misses the hermeneutic importance of modal and medial transformations (O'Halloran *et al*. 2016; Elleström 2018) across the broad variety of modalities and semiotic systems through which (human) thought unfolds and (human) societies are construed technologically. In brief, it advocates an ideal of translation as changing form (signifier) while maintaining content (signified) (Marais 2019, Ch. 3).

Conceptualizing translation through a language-centric prism has implications for thinking of machine translation as well as technology broadly. If language is considered a unique ontology, then any technology that tries to work with language must perform an ontological leap. As computing machines can

simulate language, without ever becoming "linguistic animals", simply put, translations mediated by computing machines are "dumb". Machine translations compute and pattern but have no capacity to discover and enact affordances. Machine translations are false to their linguistic analogues, which are always motivated situationally and locally, but it is also incorrect to conclude that the translated outputs that machines offer to humans, for their further interpretation, cannot also deliver, in an encoded way, the motivating situation. Figuring out (reconstructing) the motivation and situatedness of an artefact as a translation is semiotic work that humans (must) do *post hoc*. Electronic computing technologies that are used for translation are not any dumber (or smarter) in regard to human cognition than language is dumb (or smart) to human cognition. From a contemporary perspective, language itself is an AI, or better, an *Artificial Communication* technology (Esposito 2022). We posit this as a guiding principle in the development of (media, technological, AI) literacies. Through the example above (Fig. 1), we contend that understanding a machine translation such as "Take meal mouth" should be a skill of the contemporary literate human-cyborg.

Our argumentation contends that, to maintain their academic relevance, translation and semiotic theory need each other, in order to contribute to current academic discourses on technology. This involves uprooting translation from the narrower scope of linguistics. Rather, the semiotic perspective we advocate posits that (1) as all thinking is in signs, all thinking is technological; (2) language as such is a technology; and (3) translation is at work in thinking (mind-work).

Acknowledgements. For this work, Hongying Xu was supported by "the Fundamental Research Funds for the Central Universities" (No. 3132025327) in the People's Republic of China.

References

Andacht, Fernando; Michel, Mariela 2005. A semiotic reflection on self-interpretation and identity. *Theory & Psychology* 15(1): 51–75. https://doi.org/10.1177/0959354305049744

Apperley, Thomas; Jayemanne, Darshana; Nansen, Bjorn 2016. Postdigital literacies: Materiality, mobility and the aesthetics of recruitment. In: Parry, Becky; Burnett, Cathy; Merchant, Guy (eds.), *Literacy, Media, Technology: Past, Present, and Future*. London: Bloomsbury, 203–218.

Bakhtin, Mikhail M. 1981. *The Dialogic Imagination*. (Emerson, Caryl; Holquist; Michael, trans.) Austin: Texas University Press.

Bankov, Kristian 2022. *The Digital Mind: Semiotic Explorations in Digital Culture*. Cham: Springer. https://doi.org/10.1007/978-3-030-92555-0

Beerends, Siri; Aydin, Ciano 2025. Negotiating the authenticity of AI: How the discourse on AI rejects human indeterminacy. *AI & Society* 40: 263–276. https://doi.org/10.1007/s00146-024-01884-5

Bender, Emily M.; McMilan-Major, Angelina; Gebru, Timnit; Shmitchell, Shmargaret 2021. On the dangers of stochastic parrots: Can language models be too big? *FAccT'21: Proceedings of the 2021 ACM Conference on Fairness, Accountability and Transparency*. New York: Association for Computing Machinery, 610–623. https://doi.org/10.1145/3442188.3445922

Betancourt, Michael 2024. Computer creates a cat: Sign formation, glitching, and the AImage. *Semiotica* 263: 1–28. https://doi.org/10.1515/sem-2023-0108

Bijker, Wiebe; Law, John (eds.) 1992. *Shaping Technology/Building Society*. Cambridge: The MIT Press.

Boehm, Gottfried; Mitchell, W. J. T. 2009. Pictorial versus iconic turn: Two letters. *Culture, Theory and Critique* 50(2/3): 103–121. https://doi.org/10.1080/14735780903240075

Bourdieu, Pierre 2010[1984]. *Distinction: A Social Critique of the Judgment of Taste*. (Nice, Richard, trans.) London: Routledge.

Brandt, Per Aage 2020. *Cognitive Semiotics: Signs, Mind and Meaning*. (Bloomsbury Advances in Semiotics.) London, New York, etc.: Bloomsbury Academic. https://doi.org/10.5040/9781350143333

Brentano, Franz 1973[1874]. *Psychology from an Empirical Standpoint*. New York: Humanities Press.

Campbell, Cary 2018. Returning 'learning' to education: Toward an ecological conception of learning and teaching. *Sign Systems Studies* 46(4): 538–568. https://doi.org/10.12697/SSS.2018.46.4.07.

Campbell, Cary; Olteanu, Alin 2024. The challenge of postdigital literacy: Extending multimodality and social semiotics for a new age. *Postdigit Sci Educ* 6: 572–594. https://doi.org/10.1007/s42438-023-00414-8

Campbell, Cary; Olteanu, Alin; Kull, Kalevi 2019. Learning and knowing as semiosis: Extending the conceptual apparatus of semiotics. *Sign Systems Studies* 47(3/4): 352–381. https://doi.org/10.12697/SSS.2019.47.3-4.01

Chomsky, Noam 2006[1968]. *Language and Mind*. Cambridge: Cambridge University Press.

Choudhury, Monojit 2023. Generative AI has a language problem. *Nature Human Behaviour* 7(11): 1802–1803. https://doi.org/10.1038/s41562-023-01716-4

Ciula, Arianna; Eide, Øyvind 2016. Modelling in digital humanities: Signs in context. *Digital Scholarship in the Humanities* 32(1): i33–i46. https://doi.org/10.1093/llc/fqw045

Ciula, Arianna; Eide, Øyvind; Marras, Cristina; Sahle, Patrick 2023. *Modelling Between Digital and Humanities: Thinking in Practice*. Cambridge: Open Book Publishers. https://doi.org/10.11647/OBP.0369

Clark Andy; Chalmers, David J. 1998. The extended mind. *Analysis* 58(1): 7–19. https://doi.org/10.1093/analys/58.1.7

Clowes, Robert W.; Gärtner, Klaus; Hipólito, Ines (eds.) 2021a. *The Mind–Technology Problem: Investigating Selves, Minds and 21st Century Artefacts*. Cham: Springer. https://doi.org/10.1007/978-3-030-72644-7

Clowes, Robert W.; Gärtner, Klaus; Hipólito, Ines 2021b. The mind technology problem and the deep history of mind design. In: Clowes, Robert W.; Gärtner, Klaus; Hipólito, Ines (eds.), *The Mind–Technology Problem: Investigating Minds, Selves and 21st Century Artefacts*. Cham: Springer, 1–45.

Cobley, Paul 2016. *Cultural Implications of Biosemiotics*. (Biosemiotics 15.) Dordrecht: Springer. https://doi.org/10.1007/978-94-024-0858-4

Cobley. Paul 2018. Observership, knowing and semiosis. *Cybernetics and Human Knowing* 25(1): 23–47. https://doi.org/10.3390/e12092045

Cobley, Paul; Stjernfelt, Frederik 2015. Scaffolding development and the human condition. *Biosemiotics* 8: 291–304. https://doi.org/10.1007/s12304-015-9238-z

Coeckelbergh, Mark 2022. Three responses to anthropomorphism in social robotics: Towards a critical, relational, and hermeneutic approach. *International Journal of Social Robotics* 14: 2049–2061. https://doi.org/10.1007/s12369-021-00770-0

Colapietro, Vincent M. 1989. *Peirce's Approach to the Self: A Semiotic Perspective on Human Subjectivity*. Albany: State University of New York Press.

Crystal, David 2006. *Language and the Internet*. (2nd ed.) Cambridge: Cambridge University Press.

Curry, Niall; Baker, Paul; Brookes, Gavin 2024. Generative AI for corpus approaches to discourse studies: A critical evaluation of ChatGPT, *Applied Corpus Linguistics* 4(1): 100082. https://doi.org/10.1016/j.acorp.2023.100082

Danesi, Marcel 2016. *The Semiotics of Emoji: The Rise of Visual Language in the Age of the Internet*. London: Bloomsbury.

Danesi, Marcel 2017. *Language, Society and New Media: Sociolinguistics Today*. (2nd ed.) New York: Routledge. https://doi.org/10.4324/9781315100647

Deacon, Terrence 2018. Beneath symbols: Convention as a semiotic phenomenon. In: Hayes, Steven C.; Wilson, David Sloan (eds.), *Evolution & Contextual Behavioral Science.* Oakland: Context Press, 67–84.

Deacon, Terrence W. 2022. Steps to a semiotic cognitive neuroscience. In: García, Adolfo, M.; Ibáñez, Augustin (eds.), *The Routledge Handbook of Semiosis and the Brain*. London: Routledge, 30–48. https://doi.org/10.4324/9781003051817-4

Deacon, Terrence W. 2024. Beyond the symbols vs signals debate: The semiotic infrastructure of symbolic reference. Lecture presented at The Royal Society (28 Oct. 2024).

Deely, John. 2009. *Purely Objective Reality*. Berlin: Mouton de Gruyter. https://doi.org/10.1515/9781934078099

De Souza, Clarisse S. 2005. *The Semiotic Engineering of Human–Computer Interaction.* Cambridge: The MIT Press. https://doi.org/10.7551/mitpress/6175.001.0001

Dor, Daniel 2015. *The Instruction of the Imagination: Language as a Social Communication Technology*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780190256623.001.0001

Dreyfus, Hubert L., Dreyfus, Stuart E. 1986. *Mind over Machine: The Power of Human Intuition and Expertise in the Era of the Computer*. New York: The Free Press.

Eco, Umberto 1976. *A Theory of Semiotics*. London: Indiana University Press.

Eide, Øyvind 2015. *Media Boundaries and Conceptual Modelling: Between Texts and Maps.* New York: Palgrave Macmillan. https://doi.org/10.1057/9781137544582

Elleström, Lars 2018. A medium-centered model of communication. *Semiotica* 224: 269–293. https://doi.org/10.1515/sem-2016-0024

Elleström, Lars 2019. Modelling human communication: Mediality and semiotics. In: Olteanu, Alin; Stables, Andrew; Borţun, Dumitru (eds.), *Meanings & Co.: The Interdisciplinarity of Communication, Semiotics and Multimodality.* (Numanities – Arts and Humanities in Progress 6.) Cham: Springer, 7–32. https://doi.org/10.1007/978-3-319-91986-7_2

Emmeche, Claus 2001. Does a robot have an Umwelt? Reflections on the qualitative biosemiotics of Jakob von Uexküll. *Semiotica* 134: 653–693.

Ernst, Cristoph; Schröter, Jens 2021. *Media Futures: Theory and Aesthetics.* Cham: Springer. https://doi.org/10.1007/978-3-030-80488-6

Esposito, Elena 2022. *Artificial Communication: How Algorithms Produce Social Intelligence*. Cambridge: The MIT Press. https://doi.org/10.7551/mitpress/14189.001.0001

Fairclough, Norman 2006[1992]. *Discourse and Social Change*. Cambridge: Polity Press.

Favareau, Donald; Gare, Arran 2017. The biosemiotic glossary project: Intentionality. *Biosemiotics* 10(3): 413–459. https://doi.org/10.1007/s12304-017-9309-4

Fawzy, Rania M.; ElSamadoni, Shahinaz H. 2024. An Umwelt-to-Umwelt rhythmical interaction: A biosemiotic reading of cultural embodiment in the context of humanitarian VR. *Biosemiotics* 17: 847–864. https://doi.org/10.1007/s12304-024-09588-5.

Floridi, Luciano 2014. *The Fourth Revolution: How the Infosphere is Reshaping Human Reality*. Oxford: Oxford University Press.

Foucault, Michel 1977. *Discipline and Punish: The Birth of the Prison*. Harmondsworth: Penguin Books.

Friston, Karl; FritzGerald, Thomas; Rigoli, Francesco; Schartenbeck, Philipp; O'Doherty, John; Pezzulo, Giovanni 2016. Active inference and learning. *Neuroscience & Biobehavioral Reviews* 68: 862–879. https://doi.org/10.1016/j.neubiorev.2016.06.022

Fuller, Steve 2022. The mind-technology problem. *Postdigital Science and Education* 4: 247–252. https://doi.org/10.1007/s42438-021-00226-8.

Gallagher, Shaun 2005. *How Body Shapes the Mind*. Oxford: Oxford University Press. https://doi.org/10.1093/0199271941.001.0001

Galloway, Alexander R. 2012. *The Interface Effect*. Cambridge: Polity.

Gould, Stephen, J; Vrba, Elizabeth 1982. Exaptation – a missing term in the science of form. *Paleontological Society* 8(1): 4–15. https://doi.org/10.1017/S0094837300004310

Hansen, Mark B. N. 2015. *Feed-Forward: On the Future of Twenty-First-Century Media.* Chicago, London: The University of Chicago Press. https://doi.org/10.7208/chicago/9780226199863.001.0001

Hartley, John; Herrmann-Pillath, Carsten 2019. Towards a semiotics of the technosphere. *SSRN* (30 December 2018). https://doi.org/10.2139/ssrn.3308002

Hartley, John; Ibrus, Indrek; Ojamaa, Maarja 2021. *On the Digital Semiosphere: Culture, Media and Science for the Anthropocene*. London: Bloomsbury. https://doi.org/10.5040/9781501369209

Hayles, Katherine N.; Pressman, Jessica (eds.) 2013. *Comparative Textual Media: Transforming the Humanities in the Postprint Era.* Minneapolis: University of Minnesota Press. https://doi.org/10.5749/minnesota/9780816680030.001.0001

Hoffmeyer, Jesper 2008a. *Biosemiotics: An Examination into the Signs of Life and the Life of Signs*. Scranton: University of Scranton Press.

Hoffmeyer, Jesper 2008b. The semiotic body. *Biosemiotics* 1: 169–190. https://doi.org/10.1007/s12304-008-9015-3.

Hoffmeyer, Jesper 2014a. The semiome: From genetic to semiotic scaffolding. *Semiotica* 198: 11–31. https://doi.org/10.1515/sem-2013-0099

Hoffmeyer, Jesper 2014b. Semiotic scaffolding: A biosemiotic link between sema and soma. In: Cabell, Kenneth R.; Valsiner, Jaan (eds.), *The Catalyzing Mind: Beyond Models of Causality*. (Annals of Theoretical Psychology 11.) New York: Springer, 95–110. https://doi.org/10.1007/978-1-4614-8821-7_5

Hoffmeyer, Jesper 2015. Introduction: Semiotic scaffolding. *Biosemiotics* 8(2): 153–158. https://doi.org/10.1007/s12304-015-9236-1

Hoffmeyer, Jesper. 2018. Knowledge is never just there. *Biosemiotics* 11: 1–5. https://doi.org/10.1007/s12304-018-9320-4

Hoffmeyer, Jesper; Stjernfelt, Frederik 2016. The great chain of semiosis: Investigating the steps in the evolution of semiotic competence. *Biosemiotics* 9: 7–29. https://doi.org/10.1007/s12304-015-9247-y

Holmes, James S. 2004. The name and nature of translation studies. In: Venuti, Lawrence (ed.), *The Translation Studies Reader*. (2nd ed.) New York: Routledge, 180–192.

Hookway, Branden 2014. *Interface*. Cambridge, London: MIT Press. https://doi.org/10.7551/mitpress/9919.001.0001

Ihde, Don 1990[1945]. *Technology and the Lifeworld: From Garden to Earth*. Bloomington, Indianapolis: Indiana University Press. https://doi.org/10.2979/3108.0

Ingold, Tim 2000. *The Perception of the Environment: Essays on Livelihood, Dwelling and Skill.* Abingdon: Routledge.

Jacob, Michael; Ford, Judith; Deacon, Terrence 2023. Cognition is entangled with metabolism: Relevance for resting-state EEG-fMRI. *Frontiers in Human Neuroscience* 17: 976036. https://doi.org/10.3389/fnhum.2023.976036

Jakobson, Roman 2004[1959]. On linguistic aspects of translation. In: Venuti, Lawrence (ed.), *The Translation Studies Reader*. (2nd ed.) London: Routledge, 138–143.

Jasanoff, Sheila 2015. Future imperfect: Science, technology, and the imaginations of modernity. In: Jasanoff, Sheila; Kim, Sang-Hyun (eds.), *Dreamscapes of Modernity: Sociotechnical Imaginaries and the Fabrication of Power.* Chicago: The University of Chicago Press, 1–33. https://doi.org/10.7208/chicago/9780226276663.003.0001

Kapp, Ernst 2018[1877]. *Elements of a Philosophy of Technology: On the Evolutionary History of Culture*. Minneapolis: University of Minnesota Press.

Kauffman, Stuart; Roli, Andrea 2021. The world is not a theorem. *Entropy* 23(11): 1467. https://doi.org/10.3390/e23111467

Kittler, Friedrich A. 1999[1986]. *Gramophone, Film, Typewriter*. (Winthrop-Young, Geoffrey; Wutz, Michael, trans.) Stanford: Stanford University Press.

Kozicki, Alec 2023. Umwelt in an umwelt: Co-developing within immersive virtual environments and the paradoxical nature of reality and hyperreality. *Sign Systems Studies* 51(1): 73–100. https://doi.org/10.12697/SSS.2023.51.1.03

Kress, Gunther; Leeuwen, Theo van 2001. *Multimodal Discourse: The Modes and Media of Contemporary Communication*. London: Arnold.

Kull, Kalevi 2015. Evolution, choice, and scaffolding: Semiosis is changing its own building. *Biosemiotics* 8(2): 223–234. https://doi.org/10.1007/s12304-015-9243-2

Kull, Kalevi; Torop, Peeter 2012[2003]. Biotranslation: Translation between Umwelten. In: Maran, Timo; Martinelli, Dario; Turovski, Aleksei (eds.) *Readings in Zoosemiotics*. Berlin: De Gruyter Mouton, 411–426. https://doi.org/10.1515/9783110253436.411

Labov, William 1972. *Language in the Inner City: Studies in Black English Vernacular*. Philadelphia: University of Pennsylvania Press.

Lacković, Nataša; Olteanu, Alin 2024. *Relational and Multimodal Higher Education: Digital, Social and Environmental Perspectives*. London: Routledge. https://doi.org/10.4324/9781003155201

Lacković, Nataša; Olteanu, Alin; Campbell, Cary 2024. Postdigital literacies in everyday life and pedagogic practices. *Postdigital Science and Education* 6: 796–820. https://doi.org/10.1007/s42438-024-00500-5

Lakoff, George; Johnson, Mark 1999. *Philosophy in the Flesh: The Embodied Mind and Its Challenges to Western Thought*. Chicago: Chicago University Press.

Langacker, Ronald 1987. *Foundations of Cognitive Grammar. Vol. 1: Theoretical Prerequisites*. Stanford: Stanford University Press.

Lass, Roger 1990. How to do things with junk: Exaptation in language evolution. *Journal of Linguistics* 26(1): 79–102. https://doi.org/10.1017/S0022226700014432

Latour, Bruno 1990. Technology is society made durable. *The Sociological Review* 38(1 suppl.): 103–131. https://doi.org/10.1111/j.1467-954X.1990.tb03350.x

Leeuwen, Theo van 2008. New form of writing, new visual competencies. *Visual Studies* 23(2): 130–135. https://doi.org/10.1080/14725860802276263

Lotman, Juri 1990. *Universe of the Mind: A Semiotic Theory of Culture*. London: I.B. Tauris.

Magnani, Lorenzo 2021. *Eco-Cognitive Computationalism: Cognitive Domestication of Ignorant Entities*. Cham: Springer. https://doi.org/10.1007/978-3-030-81447-2

Malafouris, Lambros 2008. At the potter's wheel: An argument for material agency. In: Knappet, Carl; Malafouris, Lambros (eds.), *Material Agency: Towards a Non-Anthropocentric Approach*. New York: Springer, 19–36. https://doi.org/10.1007/978-0-387-74711-8_2

Malafouris, Lambros 2013. *How Things Shape the Mind: A Theory of Material Engagement*. Cambridge: The MIT Press. https://doi.org/10.7551/mitpress/9476.001.0001

Manovich, Lev 2013. *Software Takes Command: Extending the Language of New Media*. London: Bloomsbury. https://doi.org/10.5040/9781472544988

Marais, Kobus 2019. *A (Bio)Semiotic Theory of Translation: The Emergence of Social-Cultural Reality*. London: Routledge. https://doi.org/10.4324/9781315142319

Marais, Kobus 2023. *Trajectories of Translation: The Thermodynamics of Semiosis*. London: Routledge. https://doi.org/10.4324/9781003379713

Martinelli, Dario 2010. *A Critical Companion to Zoosemiotics: People, Paths, Ideas*. Dordrecht: Springer. https://doi.org/10.1007/978-90-481-9249-6

Martinet, André 1962. *A Functional View of Language*. Oxford: Oxford University Press.

McLuhan, Marshall 1994[1964]. *Understanding Media: The Extensions of Man*. Cambridge: The MIT Press.

Menary, Richard (ed.) 2010a. *The Extended Mind*. Cambridge: The MIT Press. https://doi.org/10.7551/mitpress/9780262014038.001.0001

Menary, Richard 2010b. Introduction: The extended mind in focus. In: Menary, Richard (ed.), *The Extended Mind*. Cambridge: The MIT Press, 1–25. https://doi.org/10.7551/mitpress/9780262014038.003.0001

Merleau-Ponty, Maurice 2010[1945]. *Phenomenology of Perception*. London: Routledge.

Neuruer, Mario; Schlögel, Stephan; Brinkschulte, Luisa; Groth, Aleksander 2018. Perceptions on authenticity in chat bots. *Multimodal Technologies and Interaction* 2: 60. https://doi.org/10.3390/mti2030060

Nida, Eugene A. 1964. *Toward a Science of Translating: With Special Reference to Principles and Procedures Involved in Bible Translating*. Leiden: E. J. Brill.

O'Grady, Gerard; Bartlett, Tom 2023. *The Language Dynamic.* Sheffield: Equinox. https://doi.org/10.3138/9781800503359

O'Halloran, Kay L.; Tan, Sabine; Wignell, Peter 2016. Intersemiotic translation as resemiotization: A multimodal perspective. *Signata: Annales des Sémiotiques/Annals of Semiotics* 7(3): 199–229. https://doi.org/10.4000/signata.1223

Olteanu, Alin 2019. *Multiculturalism as Multimodal Communication: A Semiotic Perspective*. (Numanities – Arts and Humanities in Progress 9.) Cham: Springer.

Olteanu, Alin 2021a. Multimodal modeling: Bridging biosemiotics and social semiotics. *Biosemiotics* 14: 783–805. https://doi.org/10.1007/s12304-021-09463-7

Olteanu, Alin 2021b. Translation from a contemporary media perspective: Avoiding culturalism and monolingualism. *Social Semiotics* 32(1): 143–161. https://doi.org/10.1080/10350330.2020.1714204

Olteanu, Alin; Campbell, Cary 2023a. Biosemiotics for postdigital living: The implications of the implications. *Chinese Semiotic Studies* 19(1): 161–188. https://doi.org/10.1515/css-2022-2096

Olteanu, Alin; Campbell, Cary 2023b. Biosemiotic systems theory: An embodied and ecological approach to culture. In: Coca, Juan R.; Rodríguez H., Claudio J. (eds.), *Approaches to Biosemiotics*. Valladolid: Ediciones Universidad de Valladolid, 75–98.

Olteanu, Alin; Ciula, Arianna 2023. Digital humanities and semiotics. In: Pelkey, Jamin; Cobley, Paul (eds.), *Bloomsbury Semiotics. Vol. 4: Semiotic Movements*. London: Bloomsbury, 67–86. https://doi.org/10.5040/9781350139435.ch-3

Olteanu, Alin; Ongstad, Sigmund 2024. Utterance-genre-lifeworld and sign-habit-Umwelt compared as phenomenologies: Integrating socio- and biosemiotic concepts? *Biosemiotics* 17: 523–546. https://doi.org/10.1007/s12304-024-09561-2

Olteanu, Alin; Stables, Andrew 2018. Learning and adaptation from a semiotic perspective. *Sign Systems Studies* 46(4): 409–434.

Ongstad, Sigmund 2022. Simple utterances but complex understanding? Meta-studying the fuzzy mismatch between animal semantic capacities in varied contexts. *Biosemiotics* 15(1): 85–108. https://doi.org/10.1007/s12304-022-09477-9

Paolucci, Claudio 2021. *Cognitive Semiotics: Integrating Signs, Minds, Meaning and Cognition*. Cham: Springer. https://doi.org/10.1007/978-3-030-42986-7

Peirce, Charles S. 1931–1958. *Collected Papers of Charles Sanders Peirce*. (Vols. 1–6, Hartshorne, Charles; Weiss, Paul, eds., 1931–1935; vols. 7–8, Burks, Arthur W., ed., 1958.) Cambridge: Harvard University Press. [In-text references are to CP, followed by volume and paragraph numbers.]

Petrilli, Susan 2014. The critique of glottocentrism. *Chinese Semiotic Studies* 10(1): 25–41. https://doi.org/10.1515/css-2014-0006

Petrilli, Susan; Ponzio, Augusto 2005. *Semiotics Unbounded: Interpretive Routes through the Open Network of Signs*. Toronto: University of Toronto Press. https://doi.org/10.3138/9781442657113

Petrilli, Susan; Ponzio, Augusto 2024. Biosemiotics, global semiotics and semioethics. *Biosemiotics* 17: 741–767. https://doi.org/10.1007/s12304-024-09590-x

Pietarinen, Ahti-Veikko; Beni, Majid D. 2021. Active inference and abduction. *Biosemiotics* 14: 499–517. https://doi.org/10.1007/s12304-021-09432-0

Pütz, Ole; Esposito, Elena 2024. Performance without understanding: How ChatGPT relies on humans to repair conversational trouble. *Discourse & Communication* 18(6): 869–878. https://doi.org/10.1177/17504813241271492

Raggatt, Peter T. F. 2010. The dialogical self and thirdness: A semiotic approach to positioning using dialogical triads. *Theory & Psychology* 20(3): 400–419. https://doi.org/10.1177/0959354310364878

Reboul, Anne 2017. *Cognition and Communication in the Evolution of Language*. Oxford: Oxford University Press. https://doi.org/10.1093/acprof:oso/9780198747314.001.0001

Rodríguez Higuera, Claudio J. 2019. Everything seems so settled here: The conceivability of post-Peircean biosemiotics. *Sign Systems Studies* 47(3/4): 420–435. https://doi.org/10.12697/SSS.2019.47.3-4.04

Rorty, Richard 1980. Minds, brains, and programs. *The Behavioural and Brain Sciences* 3: 417–457. https://doi.org/10.1017/S0140525X00005975.

Rorty, Richard 2004. The brain as hardware, culture as software. *Inquiry* 47(3): 219–235. https://doi.org/10.1080/00201740410006348

Rupert, Robert D. 2010. Representation in extended cognitive systems: Does the scaffolding of language extend the mind? In: Menary, Richard (ed.), *The Extended Mind*. Cambridge: The MIT Press, 325–353. https://doi.org/10.7551/mitpress/9780262014038.003.0014

Saussure, Ferdinand de 1959[1916]. *Course in General Linguistics.* (Baskin, Wade, trans.) New York: Philosophical library.

Searle, John R. 1990a. Is the brain's mind a computer program? *Scientific American* 262(1): 25–31. https://doi.org/10.1038/scientificamerican0190-26

Searle, John R. 1990b. Is the brain a digital computer? *Proceedings and Addresses of the American Philosophical Association* 64(3): 21–37. https://doi.org/10.2307/3130074

Searle, John R. 2002. End of the revolution: Review of new horizons in the study of language and mind by Noam Chomsky. *The New York Review of Books* 49(3): 33–36.

Sebeok, Thomas A. 1986. The problem of the origin of language in an evolutionary frame. *Language Sciences* 8(2): 169–176. https://doi.org/10.1016/S0388-0001(86)80014-6

Sebeok, Thomas A. 1991. *A Sign Is Just a Sign.* (Advances in Semiotics.) Bloomington: Indiana University Press.

Sebeok, Thomas A.; Danesi, Marcel 2000. *The Forms of Meaning: Modeling Systems Theory and Semiotic Analysis*. (Approaches to Applied Semiotics 1.) Berlin: Mouton de Gruyter. https://doi.org/10.1515/9783110816143

Sellars, Wilfried 1956. Empiricism and the philosophy of mind. In: Feigl, Herbert; Scriven, Michael (eds.), *Minnesota Studies in the Philosophy of Science. Vol. I.* Minneapolis: University of Minnesota Press, 253–329:

Sowa, John 1992. Conceptual graphs as a universal knowledge representation. *Computers & Mathematics with Applications* 23(2/5): 95–93. https://doi.org/10.1016/0898–1221(92)90137-7

Sowa, John 2008. Conceptual graphs. *Foundations of Artificial Intelligence* 3: 213–237. https://doi.org/10.1016/S1574-6526(07)03005-2

Sowa, John 2016. The virtual reality of the mind. *Procedia Computer Science* 88: 139–144. https://doi.org/10.1016/j.procs.2016.07.417

Stjernfelt, Frederik 2007. *Diagrammatology: An Investigation on the Borderlines of Phenomenology, Ontology and Semiotics*. Dordrecht: Springer. https://doi.org/10.1007/978-1-4020-5652-9

Theiner, Georg 2021. The extended mind: A chapter in the history of transhumanism. In: Clowes, Robert W.; Gärtner Klaus; Hipólito, Ines (eds.), *The Mind-Technology Problem: Investigating Minds, Selves and 21st Century Artefacts*. Cham: Springer, 275–321. https://doi.org/10.1007/978-3-030-72644-7_13

Torres-Martínez, Sergio 2024a. Embodied human language models vs. Large Language Models, or why Artificial Intelligence cannot explain the modal be able to. *Biosemiotics* 17: 185–209. https://doi.org/10.1007/s12304-024-09553-2

Torres-Martínez, Sergio 2024b. A predictive human model of language challenges traditional views in linguistics and pre-trained transformer research. *Language and Semiotic Studies* 10(4): 562–592. https://doi.org/10.1515/lass-2024-0018

Toury, Gideon 1995. *Descriptive Translation Studies – And Beyond*. Amsterdam: John Benjamins. https://doi.org/10.1075/btl.4

Varela, Francesco J.; Thompson, Evan; Rosch, Eleanor 1993[1991]. *The Embodied Mind: Cognitive Science and Human Experience.* Cambridge: The MIT Press.

Whitehead, Alfred North 1978[1929]. *Process and Reality: An Essay on Cosmology*. New York: The Free Press.

Wiley, Norbert 1994. *The Semiotic Self*. Chicago: University of Chicago Press.

Wittgenstein, Ludwig 1986[1953]. *Philosophical Investigations*. (Anscombe, G. E. M., trans.) Oxford: Basil Blackwell.

Wulf, Andrea 2015. *The Invention of Nature: Alexander von Humboldt's New World*. New York: Knopf.

Yu, Danni; Li, Luyang; Su, Hang; Fuoli, Matteo 2024. Assessing the potential of LLM-assisted annotation for corpus-based pragmatics and discourse analysis: The case of apologies. *International Journal of Corpus Linguistics* 29(4): 534–561. https://doi.org/10.1075/ijcl.23087.yu.

Uexküll, Jakob von 2010[1934]. *A Foray into the Worlds of Animals and Humans with a Theory of Meaning*. (O'Neil, Joseph D., trans.) Minneapolis: University of Minnesota Press.

Uexküll, Thure von; Geigges, Werner; Herrmann, Jörg M. 1983. Endosemiosis. *Semiotica* 96(1/2): 5–51. https://doi.org/10.1515/semi.2001.013

Zlatev, Jordan; Sonesson, Göran; Konderak, Piotr (eds.) 2016. *Meaning, Mind and Communication: Explorations in Cognitive Semiotics*. (New ed.) Frankfurt am Main: Peter Lang. https://doi.org/10.3726/978-3-653-04948-0

愚钝的智能？——关于“翻译”作为技术媒介的符号学新思考

本文提出一种符号学的视角，来理解并评估语言技术。具体而言，通过采用库布斯·马雷（Kobus Marais）**近年提出的广**义“翻译”**符号学理念，使符号学理**论能够服务于技术哲学的探讨。通过实例分析，文章揭示：当语言生成技术被置于“设计类人对话者”**的理想之下**时，人们对其能力的普遍期待是错误并具有误导性的。我们发现，（软件）工程是追求这一理想的，而这理想深受古典人文主义的驱动，将语言视为人类专属的标记。通过将（技术性）涌现理解为一种符号活动过程，文章为“**心智—技**术论”（Mind–Technology Thesis）**提供了**坚实的理论基础：即以一种将技术视为心智工作的进化论视角，来反驳心物实体二元论。因此，符号学与外在主义心智理论及后现象学形成了一致，都认为心智与技术理解彼此内在、不可分割。这就为埃琳娜·**埃斯波西托**（Elena Esposito）**所主**导的技术哲学观提供了符号学理上的支持，即人工制品在与生物有机体实现有效沟通时，并不需要具备所谓的“**智能**”

Rumal intellekt? Tõlge kui tehnoloogiline vahendus

Pakume välja semiootilise lähenemise keeletehnoloogiate mõistmisele ning hindamisele. Võttes kasutusele Kobus Marais’ poolt viimasel ajal välja töötatud semiootilise ja avara tõlkekäsitluse, rakendame semiootikateooriat eelkõige tehnikafilosoofia teenistuses. Meie vaatenurgast nähtub, et keelt genereerivatele tehnoloogiatele üldiselt ja eelduspäraselt esitatavad ootused osutuvad ekslikeks ja eksitavateks, kui neid kujundatakse inimtaoliste kaasvestlejate konstrueerimise ideaali kaudu, ning me illustreerime seda näidetega. Oleme seisukohal, et (tarkvara)insenerlus püüdleb selle ideaali poole, mis klassikalisest humanismist kantuna eeldab, et keel on antroopsuse näitaja. Selgitades tehnoloogiate esiletõusu semioosilise protsessina, töötame välja toeka vundamendi nn “vaimu–tehnoloogia teesile”, nimelt lükates ümber vaimu ja materiaalse substantsi dualismi, kasutades evolutsionistlikku vaatenurka, mis tõlgendab tehnoloogiat vaimutööna. Sel moel kinnitab semiootika eksternalistlikke vaimuteooriaid ning postfenomenoloogiat, mõistes vaimu ja tehnikat vastastikku omastena. See viib välja semiootikal põhineva toetuseni tehnikafilosoofia seisukohale, mille eest seisab Elena Esposito, et selleks, et oleks võimalik artefaktide tegelik kommunikatsioon bioloogiliste organismidega, ei lähe neil “intellekti” tarvis.