

A CASE OF BIDIRECTIONAL METAPHOR: A COMPUTER AS A HUMAN BEING AND THE REVERSE

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Introduction

The prevailing computer technologies, having inevitably shaped our activity and surroundings, have also pervaded human thoughts, feelings, language and self-perception. The interaction between the human being and the computer has become so close and all-embracing, that the difference between human and machine is hard to pinpoint and in some cases ceases to exist. This interrelation is well reflected in language, which demonstrates the diffusion of computing terms applied to human thoughts, processes and interactions – and vice versa. A person with exceptional memory or calculation skills has “a computer in his/her brain” or forgetting unimportant things is “deleting unnecessary files” in one’s mind. On the other hand, a computer’s central processing unit is its “brain”, a computer can put itself to “sleep” and computers interchanging data are “talking to” each other. The crossed meanings result from metaphorical mappings, which, in the tradition of Cognitive Metaphor Theory, are defined as A COMPUTER IS A HUMAN BEING and A HUMAN BEING IS A COMPUTER. The existence of reverse mappings raises questions about the directionality of the computer-human metaphors, which will be discussed in the present paper.

The aim of this article is to reveal the conceptualization of computers as human beings and vice versa as metaphoric mappings that exhibit reverse source-target orientation and are, therefore, qualitatively different. To achieve this aim, the following **research objectives** have been set:

- to provide a theoretical background for conceptual metaphor analysis;
- to discuss the etymology of the word “computer” and the development of its meanings through lexicographic definitions;
- to collect and classify metaphoric expressions explicating metaphors under analysis in the English language;
- to reveal the personification of the computer as a conceptual metaphor A COMPUTER IS A HUMAN BEING and the metaphorization of the human being as a computer via A HUMAN BEING IS A COMPUTER mapping, their qualitative differences and implications.

Since linguistic metaphors form the main

directly observable evidence for conceptual metaphors, one of **research methods** in this investigation is the qualitative analysis of conceptual metaphors manifested in the use of language. The corpus-based approach (in contrast to corpus-driven) has been undertaken: the potential linguistic realizations of the metaphors have been established using intuition and dictionaries and then investigated trawling concordances from the corpus. The data for this research have been retrieved from two electronic corpora of the English language: the British National Corpus (<http://corpus.byu.edu/bnc>) and the Corpus of Contemporary American English (<http://www.americancorpus.org>). The results obtained have been discussed to accompany the scientific literature analysis dealing with previous studies in the field of computer-human interaction, metaphor in technology language, cognitive psychology, etc.

Theoretical background

The Conceptual (or Cognitive) Metaphor Theory, i.e. a conceptual account of metaphor as a mechanism of thought rather than language, was largely initiated by Lakoff and Johnson (1980) in *Metaphors We Live By* and later elaborated by a number of cognitive scientists engaged in metaphor research. Since our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature, metaphor is one of the most basic mechanisms for understanding our experience. In the view of cognitive linguistics, metaphor is defined as understanding one conceptual domain in terms of another conceptual domain, which is any coherent organization of experience. The conceptual domain from which we draw metaphorical expressions to understand another domain is called source domain, while the domain understood this way is target domain (Kövesces, 2002). Thus, for example, understanding the workings of the human mind as information processing performed by a computer results from the conceptual metaphor A HUMAN BEING IS A COMPUTER, where the knowledge from the computer domain as the source is mapped onto the domain of the human being, which is the target. It is manifested in the following linguistic examples:

(1) *We must programme our minds to be*

expansive and creative and eliminate the words "I can't" from our vocabulary (BNC).

(2) *She had a mind like a computer, with an indefinite retrieval of unimportant facts (BNC).*

One of the major tenets of the Conceptual Metaphor Theory is that metaphor is central to abstract language. "Because so many of the concepts that are important to us are either abstract or not clearly delineated in our experience (the emotions, ideas, time, etc.), we need to get a grasp on them by means of other concepts that we understand in clearer terms (spatial orientations, object, etc.)" (Lakoff and Johnson, 1980). Thus, metaphorical process typically goes from the more concrete to the more abstract but not the other way round, which is called the principle of unidirectionality (Kövesces, 2002). It means that metaphors map structure from a source domain to a target domain but not vice versa. For instance, while we conceptualize LOVE in terms of JOURNEYS, we cannot conventionally structure JOURNEYS in terms of LOVE: travelers are not conventionally described as 'lovers', or car crashes in terms of 'heartbreak', and so on. Hence, the terms 'target' and 'source' encode the unidirectional nature of the mapping (Evans and Green, 2006).

A thorough analysis of the unidirectionality (or asymmetry) of metaphor as well as cases of metaphoric inversion, i.e. pairs of conceptual metaphors that employ the same metaphoric mapping but exhibit reversed topic-vehicle (other terms for target and source) orientation, including such pairs as PEOPLE ARE COMPUTERS and COMPUTERS ARE PEOPLE, is provided by Deane (1993). He overviews many studies which have demonstrated that metaphor is asymmetric and non-reversible and are thus "congruent with widely accepted views of metaphor, according to which metaphor is a way to use familiar, highly structured, or concrete concepts as vehicles by which we understand the unfamiliar, amorphous, or abstract concepts that typically serve as metaphoric topics". His own study, however, proves the existence of reversed (or inverted) metaphors, which, he admits, is "an unusual phenomenon because the usual effect of reversing a metaphor is anomaly or a complete shift in the metaphor's conceptual ground" and results in apparent qualitative differences. The author also speaks of qualitative asymmetry to refer to different statuses of reverse metaphors: one of the metaphors in a pair functions as an ordinary personification or anthropomorphism, not taken seriously or extended beyond its areas of applicability to the topic; the other metaphor seems, by contrast, to carry moral or philosophical overtones and to be actively extended. In case of the computer-human

metaphors, COMPUTERS ARE PEOPLE metaphor is an entirely conventional and does not seem to carry ontological implications, while the metaphor PEOPLE ARE COMPUTERS has clear ontological implications about the nature of the mind, taken seriously by researchers in cognitive science. The author also observes that personifications tend to be acquired earlier than reverse metaphors and are, therefore, "original", while the latter are logically, and perhaps temporally, subsequent.

"Computer": etymology and lexicographic definitions

The noun "computer" is derived from the verb "compute", which, according to Online Etymology Dictionary (www.etymonline.com), comes from Latin *computare* 'to count, sum up' (*putare* 'to reckon'). Its original meaning thus refers to a person who does mathematical calculations, i.e. computes (dating to 1646). At the end of the 19th century mechanical calculating machines were given the supposedly metaphorical name "computers", as they did work equivalent to that done by the human employees. With advance in technology, it further evolved to the modern meaning 'programmable digital electronic computer', which has been in use since 1945 and is the only meaning of "computer" for modern users.

The development of the meaning of the word "computer" can be observed through analysis of lexicographic definitions in dictionaries in the course of time. The author of *Technobabble* (Barry, 1993) finds it strange that the 1969 edition of the American Heritage Dictionary of the English Language lists the primary meaning of computer as 'a person who computes', yet the copyright page mentions that the book was computer-composed by Infonics, Inc., in Maynard: "It seems astonishing that well into the age of computers, a dictionary would still consider as the primary meaning of this word a person performing calculations. By 1969 there was no doubt in most people's minds about what a computer was". According to dictionaries published in recent decades, "computer" refers to the machine only (the original meaning 'a person who calculates' is lost):

- 'an electronic machine which is used for storing, organizing and finding words, numbers and pictures, for doing calculations and for controlling other machines' (Cambridge International Dictionary of English, 1996);
- 'a device, usually electronic, that processes data according to a set of instructions' (Collins English Dictionary, 2003).

The computer-as-human metaphor: anthropomorphism

As has been noted above, the very emergence of the meaning of a computer as an electronic device is based on the analogy between the machine and the human being, which constitutes the anthropomorphic metaphor, i.e. attributing human characteristics to nonhuman objects or phenomena. Anthropomorphization is a common tendency in language (often in technical vocabulary); however, “the computer industry outpaces all others in the area of anthropomorphic language. Computers seem almost human in many ways, so an inevitable result of that similarity is that much of the language describing computers seem to refer to humans” (Barry, 1993). Barry demonstrates some of the early instances of describing computer processes in human terms by the examination of the Reader’s Guide to Periodical Literature, starting in mid-1945: *Electrical Memory*, *It Thinks with Electrons*, *100-Ton Brain at MTI*. It is evident that the advent of computer technologies was accompanied by adoption of the anthropomorphic metaphor as the source of scientific terminology of a new field.

The role of metaphor in reflecting and developing scientific ideas has been widely acknowledged (Boyd, 1983, Rodriguez, 2006, Goschler, 2007), which is directly related to establishing terminology of a specific field: in scientific and technical vocabulary lexical items of general language are figuratively used to form a special language vocabulary. A corpus-based study of metaphor in information technology, performed by Izwaini (2003), reveals that metaphor is the most used method for creating new vocabulary in the language of information technology. One of the dominant metaphors is the conceptual mapping THE COMPUTER IS A LIVING BEING, accounting for the following terms: *language, memory, virus, sleep, wake, dialogue, widow/orphan*, etc. Apart from computing terminology, the metaphorization of a computer as a human being is abundantly manifested in everyday language, reflecting the common-sense understanding of the machine as a person. The tendency is observed and studied in many languages. For example, Hänke discusses bodily metaphors or anthropomorphisms applied to computers in the German language, distinguishing two main aspects of these metaphors: 1) metaphors that map psychological qualities like intentions, emotions, memory, and intelligence on the computer and 2) mapping of the body and its functions on the computer (according to Goschler, 2005).

The analysis of linguistic metaphors retrieved from the corpora of the English language has revealed similar tendencies. Major mappings come from the

following sub-domains of the human being:

- **life and death** (functioning corresponds to living and loss of function to death), e.g.:

(3) *Now the face of the tiny computer is alive with numbers – they fly by much too fast for us to make them out clearly (CCAЕ).*

(4) *If every computer died tonight, life would go on (CCAЕ).*

- **sleep** (stoppage in functioning for a defined period or until some event triggers an “awakening” corresponds to sleep), e.g.:

(5) *Make sure your computer puts itself to sleep if it’s idle for more than 15 or 30 minutes (CCAЕ).*

(6) *After awakening the computer from its power-save slumber he copied the add-in from the floppy back to the internal hard drive (CCAЕ).*

- **thought and intelligence** (data processing corresponds to thought and processing power corresponds to intelligence), e.g.:

(7) *Why think if the computer can do the thinking for you? (BNC)*

(8) *[...] the Sun indexing project has attempted to develop a computer program “smart” enough to categorize new information it encounters (CCAЕ).*

- **verbal communication** (input/output processes and links between computers correspond to verbal communication), e.g.:

(9) *To return to data mode and talk to the other computer again, type ATO (CCAЕ).*

(10) *The computer’s telling them it’s in stock (BNC).*

(11) *The fax part lets the computer talk to fax machines; the modem part lets it talk to other computers (CCAЕ).*

In addition, computers conceptualized as people can be tired or sick of something, often due to a large amount of information:

(12) *“I’ve sent out so many resumes I’ve tired my computer out,” she said (CCAЕ).*

(13) *Hell, the computer is sick of this movie. The computer is so full and so slow, it’s practically begging for someone to reboot (CCAЕ).*

In this human-like view, computers can also have feelings, show emotions, their own will and socialize with people:

(14) *And now a computer; a machine, is said to have intelligence. Well, if this is the case, how did the computer feel when it lost? (CCAЕ)*

(15) *The computer sounded insulted (CCAЕ).*

(16) *...because Medicare still listed her as dead, the computer refused to issue her checks (CCAЕ).*

(17) *So hearing there were computer classes here, he started coming and he didn’t like it and he*

stopped. And then after a couple of weeks he still couldn't get on with his computer, so he came back (BNC).

(18) *I loved my computer for its friendly criticism and the good advice it gave me (CCAЕ).*

Although anthropomorphism is a conventional metaphor in language, the implications of this conceptual metaphor extend far beyond the language. A number of scholars (Farzanfar, 2006; Nass and Moon, 2000; Luczak et al, 2003), dealing with human-computer interaction, have highlighted its socialness, i.e. the psychological tendency to behave socially with a computer (also called psychological anthropomorphism). A series of experimental studies have demonstrated that people mindlessly apply social rules and expectations to computers, i.e. they interact with technical devices as if the devices were human. Most often people are observed talking to the devices (cursing or scolding if the computer is not functioning or motivating it to be faster), but often they are hitting or stroking them. People often use the same social rules to assess and respond to the performance of computers that they would use when assessing or responding to other human beings, even when they are fully aware that they are interacting with machines. For example, individuals are shown to apply politeness norms to computers or even ascribe gender categories, which has been also noted in some linguistic expressions from the corpora, e.g.:

(19) *“Ebbie? Talk to me, girl. “I know, it's inconsistent and illogical to give a ship a man's name and still refer to it, and to the computer's personality mode, as female, but that's the way it is. It's not just me, I promise (CCAЕ).*

It is interesting to note that this anthropomorphic tendency has been severely criticized by some specialists of the computing field. Barry (1993) cites Dijkstra, who claims: “The anthropomorphic metaphor is an enormous handicap for every computing community that has adopted it. I have now encountered programs wanting things, knowing things, expecting things, believing things, etc. In computing science, the anthropomorphic metaphor should be banned”.

The human-as-a-computer metaphor: the computational theory of the mind

The reverse of the previous conceptual mapping is the metaphor A HUMAN BEING IS A COMPUTER, which means viewing a human being as an information-processing system. The operations performed by a computer are thus mapped onto the human mind, which encompasses aspects of intellect and consciousness such as thought, perception,

memory, emotion, will and imagination.

The analogy of the mind and a computer was first employed in cognitive psychology in the sixties of the 20th century, when researchers of the field applied the concept of a computer to theorize about the workings of the human mind. Human thought was understood as an elaborate form of computation, thus certain parts of a computer (memory storage, hard-disk) and functions (programs, RAM and ROM) and the differentiation of hard- and software as well as on- and offline, in connection with more general electronic metaphors (wires, circuits, switching on/off) became prominent source domains for the description of the brain structures and mental activity in scientific explanations (Goschler, 2007). This model of the mind as an information-processing machine was termed the computational theory of the mind or computationalism and became the dominant paradigm in neuroscience, psychology and philosophy of mind. It is thus one of “science-derived” (Rodriguez, 2006) or “theory-constitutive” (Boyd, 1993) metaphors that appear first in the context of scientific practice and later get disseminated among inexpert language users (Karaliūtė and Nevidonskienė, 2008).

The analysis of the linguistic explications of the conceptual metaphor A HUMAN BEING IS A COMPUTER in English has revealed the following aspects which are most frequently mapped from the domain of computing:

- **memory** (remembering is likened to the retrieval of information from a computer, while forgetting equals to deleting), e.g.:

(20) *“My mind's not a computer, Bodie. I don't remember every single item in every untidy report that the two of you have ever put in [...] (BNC).*

(21) *It was in fact going to be a “complex” process, since it would require permanent, steady and patient activity to delete from people's minds the remains of the past, the obsolete conceptions, mentalities and customs [...] (BNC).*

(22) *In fact it's not that the memory is lost, so much as the person can't get out the facts which are stored in the memory. It's rather like a computer when the disc goes wrong – you know the info is there but you can't tap into it (BNC).*

- **speed** (ability to perform operations at high speed signals efficient working of the mind conceptualized as a computer), e.g.:

(23) *“But when you're in big business like I am, you've got to be hot stuff at arithmetic. I've practically got a computer inside my head. It took me less than ten minutes to work the whole thing out” (BNC).*

(24) *Like a computer, it's not that you're clever,*

it's just that you can access old records with amazing speed (CCAЕ).

- **programming** (human beings like computers perform instructions received rather than think and act by their own volition), e.g.:

(25) [...] *your minds have programmed you against wealth and pleasure, against things that make your eyes sparkle and your feet dance (BNC).*

(26) *With the mind and body so negatively programmed, this golfer is unlikely to produce his best swing (BNC).*

Recurring to the scientific explanations of the mind, it is essential to note that numerous discrepancies have been observed between a computer and the mind and the computational theory has been rejected in cognitive psychology. According to Fonagy and Target (2007), “analysts appropriately saw it as in many ways dehumanizing, clinically irrelevant, and incompatible with some fundamental psychoanalytic ideas”. Thus it is commonly accepted that science has gained a lot from the computer metaphor but also missed some things, which inevitably issues from the partial nature of metaphorical structuring: as a conceptual tool, any metaphor both aids and impedes us in our understanding (Randall, 2007). Gardner called this phenomenon “the computational paradox”: “only through scrupulous adherence to computational thinking could scientists discover the ways in which humans actually differ from the serial digital computer” (Gardner, 1985).

Nevertheless, the computer metaphor has significantly affected human perception of the world, including our own being. Denny and Sunderland (2005) observe and question: “It is not just the computer’s speed that has infiltrated notions of work, productivity and intelligence and that has put us in a perpetual state of immediacy. It is the surfing, the e-mailing, the embedding, the instant messaging and chatting, the finding, the inserting, the linking that give the cues for comprehending and interpreting what is around us, and for enacting and reenacting that reality. Our tropes for how we communicate with one another have also been influenced – we now have online and offline conversations. In our encounters with people, are we becoming more like our e-mail – brief, casual, punctuated and immediate? Are we surfing places much as we do websites?”

The above implications of the conceptual metaphor A HUMAN BEING IS A COMPUTER are often regarded as technological dehumanization or the reduction of humans to machines, a cultural condition of postmodern society (Haslam, 2006). The former conceptual mapping with reverse direction of source-target orientation, i.e. A COMPUTER IS A HUMAN BEING, manifests the

anthropomorphic tendency, i.e. ascribing human features to the machine. Put together, they point to blurred boundaries in the interrelation of technology and a human being, reflected in abundant scientific terms and colloquial expressions explicating the conceptual mappings. Recurring to Deane’s (1993) qualitative asymmetry or the different statuses of reverse metaphors, one should agree that the human-as-a-computer metaphor carries more moral and ontological implications, considering the effect of the computational theory of mind in cognitive science. Its power and controversy made it “the subject of reflections on metaphors and analogies in the history of science” (Goschler 2007). The reverse mapping, based on the anthropomorphization of the computer, is anterior and conventional, accounting for a significant part of scientific terminology in the field of computing. Its spread into colloquial language as well as the sphere of social interaction (psychological tendency to behave socially with a computer), however, allows partial disagreement with Deane’s statement that anthropomorphism is not taken seriously or extended beyond its areas of applicability. The implications of metaphors in both directions should not be underestimated, as they both have affected the conceptualization of the human being, the nature of humanness itself and its status in the surrounding world of computers.

Conclusions

1. The all-embracing human-computer interaction, as an inevitable part of modern society, is well reflected in the language, where computer components and processes are described in human terms and computing terms applied to human thoughts, processes and interrelations.
2. The crossed meanings result from a pair of metaphorical mappings, which, in the tradition of Cognitive Metaphor Theory, are defined as A COMPUTER IS A HUMAN BEING and A HUMAN BEING IS A COMPUTER. The existence of reverse mappings signals the bidirectional character of the metaphor, which is not a regular case in conceptual metaphor studies.
3. The modern meaning of “computer” as ‘an electronic device that processes data’ metaphorically evolved from the original meaning of “computer”, namely ‘someone who computes, i.e. calculates’.
4. Numerous computing terms and colloquial expressions in English explicate the anthropomorphic metaphor A COMPUTER IS A HUMAN BEING, when certain aspects of the human life (life and death, sleep, thought and intelligence,

verbal communication, some psychological characteristics) are mapped on the target domain of computer. A number of studies have also indicated psychological anthropomorphism, i.e. the psychological tendency of people to behave socially with a computer.

5. The reverse mapping A HUMAN BEING IS A COMPUTER ascribes computer-like qualities and processes to the human being (speed, efficiency, memory processes, programming), representing the view of a human being as an information-processing system. It constitutes the computational theory of the mind, which was once the dominant paradigm in neuroscience, psychology and philosophy.
6. Metaphors in both directions have had a significant impact on the development of scientific terminology as well as everyday communication, pointing to blurred boundaries in human-computer interaction and technological dehumanization as a condition of postmodern society.

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A CASE OF BIDIRECTIONAL METAPHOR: A COMPUTER AS A HUMAN BEING AND THE REVERSE

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Summary

The article discusses bidirectional metaphorization based on the analogy of the computer and the human being. A corpus-based analysis of metaphoric expressions retrieved from electronic corpora of the English language provides evidence for bidirectional metaphoric mappings, which, in the tradition of Cognitive Metaphor Theory, are formulated as conceptual metaphors A COMPUTER IS A HUMAN BEING and A HUMAN BEING IS A COMPUTER. The etymology

of the word “computer” and the development of its meanings reveal the origin of the anthropomorphic metaphor A COMPUTER IS A HUMAN BEING, while linguistic data show that certain aspects of the human life (life and death, sleep, thought and intelligence, verbal communication, some psychological characteristics) are mapped on the domain of computer. The reverse metaphor A HUMAN BEING IS A COMPUTER ascribes computer-like qualities and processes (speed, efficiency, memory processes, programming) to the human being, representing the view of a human being as an information-processing machine. The implications of both metaphors are discussed to demonstrate blurring boundaries in human-computer interaction as a feature of modern society.

Keywords: conceptual metaphor, directionality, computer, human being, anthropomorphism, computational theory of mind.

DVIKRYPTĖS METAFOROS ATVEJIS: KOMPIUTERIS KAIP ŽMOGUS IR ATVIRKŠČIAI

Edita Karaliūtė

Santrauka

Straipsnyje nagrinėjama dvikryptė metaforizacija, paremta kompiuterio ir žmogaus analogija. Kalbinių metaforų analizė, atlikta remiantis elektroninių anglų kalbos tekstynų duomenimis, rodo dviejų kryptų reikšmės perkėlimus, kurie, remiantis kognityvinės metaforos teorija, formuluojami kaip konceptualios metaforos KOMPIUTERIS YRA ŽMOGUS ir ŽMOGUS YRA KOMPIUTERIS. Žodžio „kompiuteris“ etimologija ir reikšmių raida atskleidžia antropomorfinės metaforos KOMPIUTERIS YRA ŽMOGUS kilmę, o kalbos duomenys rodo, kad tam tikri žmogaus gyvenimo aspektai (gyvenimas ir mirtis, miegas, mąstymas ir intelektas, žodinis bendravimas, kai kurios psichologinės savybės) perkeliama į kompiuterio sferą. Priešingos metaforos – ŽMOGUS YRA KOMPIUTERIS – esmę sudaro kompiuteriui būdingų savybių ir procesų (greičio, efektyvumo, atminties procesų, programavimo) priskyrimas žmogui, kuris suvokiamas kaip informacijos apdorojimo mašina. Aptariamos abiejų metaforų paplitimo ir poveikio tendencijos, atspindinčios nykstančią ribą tarp žmogaus ir kompiuterio, būdingą šiuolaikinei visuomenei.

Prasminiai žodžiai: konceptuali metafora, kryptiškumas, kompiuteris, žmogus, antropomorfizmas, „kompiuterinė“ proto teorija.

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