Language and Outer Space

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Abstract  
The 2016 much acclaimed American sci-fi movie Arrival is based on (what is in reality an extension of) the so-called “Sapir-Whorf” hypothesis, a linguistic theory set forth in the first half of the 20th century, according to which one’s native language dictates the way in which one perceives reality. By taking into account the latest in human knowledge, this paper tries to provide arguments as to why such a claim works wonderfully in fiction, but not in science.

Keywords  
Language determinism, perception of reality, brain rewiring, experience

In November 2016, a highly acclaimed science-fiction movie was released in American movie theaters, and part of its huge success¹ was undoubtedly rooted in a (still) fascinating linguistic hypothesis that goes around by the name of linguistic determinism. A very brief but necessary reminder about the plot involves twelve extraterrestrial space craftsthat land simultaneously in twelve different places on our planet and remain there without showing any sign of hostility. The great military powers are alerted and try to figure out the purpose of this arrival. In the U.S., Louise Banks (a linguist and polyglot) is hired by the military to find out about the language of the aliens - two huge heptapodic creatures that show themselves within one such vessel, behind a transparent wall.

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Starting from the symbols projected by the heptapodes on this wall, - some unique circular configurations that make it impossible to identify a beginning and an end -, Louise understands that their written system of communication does not display the linearity of human writing. It does not obey the sequentiality that governs any language on our planet. She finally gets to decipher and master the language of the heptapodes, and this gives her the capacity to evade temporal linearity and to perceive time as a continuum. This also grants her free access to knowing about any event in the future, since past, present, and future become useless concepts in her new perception of reality.

The key to understanding this movie lies in a dialogue between Louise and Ian Donnelly, a physicist, where the idea that one’s language determines the way one perceives reality comes up. The possibility is expressed for one to immerse oneself in a foreign language so as to consequently rewire one’s brain and become attuned to a new reality. Louise identifies this idea as the Sapir-Whorf hypothesis” and, in light of what we see next, we understand that she becomes living proof of that. And this is where our discussion begins, with a brief explanation of this hypothesis first.

Rooted in German thinking (through G. von Leibniz and A. von Humboldt), the idea that language influences thought appeared in American writings by Franz Boas, Edward Sapir and Benjamin Lee Whorf. Sapir (1884-1939), a German-American anthropologist and linguist, on attending a New York conference in 1926, maintained that

Human beings do not live in the objective world alone, nor alone in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society. /.../. The fact of the matter is that the ‘real world’ is to a large extent unconsciously built up on the language habits of the group. No two languages are ever sufficiently similar to be considered as representing the same social reality. /.../. Even comparatively simple acts of perception are very much more at the mercy of the social patterns called words than we might suppose. If one draws some dozen lines, for instance, of different shapes, one perceives them as divisible into such categories as ‘straight’, ‘crooked’, ‘curved’, ‘zigzag’ because of the classificatory
suggestiveness of the linguistic terms themselves. We see and hear and otherwise experience very largely as we do because the language habits of our community predispose certain choices of interpretation. (Sapir, 1993:10-11)

If Sapir targets vocabulary more than anything else, his student, Benjamin Lee Whorf (1897-1941) seems to consider syntax more:

/.../ the background linguistic system (in other words, the grammar) of each language is not merely a reproducing instrument for voicing ideas but rather is itself the shaper of ideas, the program and guide for the individual’s mental activity, for his analysis of impression /.../. We dissect nature along lines laid down by our native languages. /.../... no individual is free to describe nature with absolute impartiality but is constrained to certain modes of interpretation. (Whorf, 1993:34)

Thus, our worldviews are restrained by our native tongues, since their categories impose on us descriptions and interpretations of reality as many as there are languages on earth. Hence, the possibility of a free and truly objective description of the world is an illusion as long as thoughts are molded into fixed, pre-existent (linguistic) forms.

A common argument used as evidence is the category of time. In Whorf’s radical views, time is perceived differently by native American Hopi tribe members. While we, Europeans, see time as a succession of events that we group into past, present and future (allegedly because we have these tenses in our languages), the Hopi speak a “timeless language” in which European divisions are matched by epistemic markers like, for example, expectation for future.

Although Whorf’s claims were later disproved by solid linguistic studies by Helmut Gipper and Ekkehart Malotki, time continues to haunt researchers at present. Stanford University professor of psychology and neuroscience Lera Boroditsky contrasts the way in which English speakers use horizontal spatial metaphors (the future is ahead, the past is behind) to Mandarin Chinese speakers’ vertical spatial metaphors (the future is up, the past is down), which would be proof of a different perception of time. She says that language can affect even basic aspects of time perception:
For example, English speakers prefer to talk about duration in terms of length (e.g., "That was a short talk," "The meeting didn't take long"), while Spanish and Greek speakers prefer to talk about time in terms of amount, relying more on words like "much" "big", and "little" rather than "short" and "long." Our research into such basic cognitive abilities as estimating duration shows that speakers of different languages differ in ways predicted by the patterns of metaphors in their language. (For example, when asked to estimate duration, English speakers are more likely to be confused by distance information, estimating that a line of greater length remains on the test screen for a longer period of time, whereas Greek speakers are more likely to be confused by amount, estimating that a container that is fuller remains longer on the screen.) (Boroditsky, online article 06.11.09)

The way in which language shapes our perception of time comes up in unexpected places, testifying to a genuine revival of Whorfianism: in his June 2012 conference, American behavioral economist Keith Chen discusses the connection between language and money-saving patterns of behavior. Mandarin Chinese, he says, does not make use of grammatical markers for time. The verb has an invariable form, and the moment of the action expressed by the verb is communicated by time adverbs (like today, yesterday, tomorrow, etc.). In contrast, European languages have specific temporal markers (past tense endings like –ed or future auxiliaries like shall/will etc. in English, for example). The consequence would be a mental lack of sharp dissociation between present and future, which would make money-saving easier than in the case of those speakers who, due to neat linguistic distinctions, perceive the future as something distant, different from the present, something that would not encourage them to save money.

Language and time are two crucial concepts in the movie Arrival: the heptapodes perceive time as a continuum, with no beginning and no end (suggested by their circular written symbols). Alien language learning comes, for Louise, with a correspondent perception of reality: time is no longer succession but simultaneity. She has instant mental access to any event in the (human) past or future. We must notice that this is not the original “Sapir-Whorf” hypothesis, which never targeted a foreign language but just mother tongues. Instead, it is an extrapolation, a neo-
Whorfian development rather, that – interestingly – does not occur only in this sci-fi movie but also in real life: at present, we witness a wealth of studies and experiments (by anthropologists, sociologists, and psychologists) that take things that far. The new understanding is that, if one’s mother tongue dictates a certain type of perception (although this has never been proven!), then mastering a foreign language grants one access to a different kind of perception.

But, as appealing as this may sound, bilinguals or polyglots do not perceive reality differently from monoglots, even if their proficiency enables them to dream in a foreign language, and that is because no foreign language can rewire brain circuitry since, in humans, neural configurations are molded by interaction with the environment. It goes without saying that differences in lexis (although, as we have seen, Whorf targets syntax) are (also) motivated by geographical conditions; but time is, on Earth, an objective, ontological category, set by planetary motions that impose cause-effect relationships, in which succession makes the rules. Space and time are given to us as objective landmarks (i.e. their existence does not depend on our perception) in order for us to be able to function correctly for a lifetime in this world, and not in another. The unnaturalness of the environment (a misalignment between what we see and what we know from what we have lived) may trigger visceral responses: in terrestrial experiments that involve loss of spatial points of reference, disorientation causes phenomena ranging from simple vertigo to fainting (while, in the movie, the team walks on the ceiling of a tunnel and is just fine with it).

Today’s cognitivist linguistics, that uses data from the most variegated domains of activity – beginning with neuroscience and ending with computer science -, shows that time linearity and man’s biological makeup prevent us from escaping a certain type of perception no matter how many foreign languages we may speak. And this is precisely so because all of them are molded by and for earthly environments. Language, whatever its name, is verbally encoded experience.

The biological and environmental conditioning of our abilities is so pervasive that the language of some alien race would be hard – if not impossible – to decode since we use mathematical algorithms governing our own DNA. It is wise to assume that an alien language would be
similarly molded by the environment of that alien race so that it may describe their own realities. If Earth and another planet had absolutely nothing in common, then we would not be able to identify the things we would be looking at, because they would correspond to nothing in our world. We would experience visual agnosia – a neurological condition involving inability to recognize shapes. If we were listening to the spoken alien language (providing the aliens had a vocal tract!), we would undoubtedly experience auditory agnosia – an amorphous mass of sounds corresponding to none of the human languages phonemes, that can be only heard, or recorded, but not understood (which implies recognition, while re-cognition implies cognition).4

In spite of all this, Whorfianism and its new developments continue to take a privileged place on the stage of today’s most challenging ideas. The premises they start from are not only spectacular but also hard to be scientifically demonstrated; the claims they make are intriguing and raise people’s expectations from learning foreign languages. But, since they come (with few exceptions) from researchers in fields other than linguistics (let us not forget that B. L. Whorf himself had no linguistic background), let us oppose, for balance, the opinion of all-time greatest European linguist, Ferdinand de Saussure:

... in the lives of individuals and societies, speech is more important than anything else. /.../ But – and this is a paradoxical consequence of the interest that is fixed on linguistics – there is no other field in which so many absurd notions, prejudices, mirages, and fictions have sprung up. From the psychological viewpoint these errors are of interest, but the task of the linguist is, above else, to condemn them and to dispel them as best he can. (Saussure 1916:7)

References


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1 Directed by Denis Villeneuve and starring Amy Adams, it is now considered one of the best films of 2016; it received prestigious awards and nominations for different prizes.

2 Which, in its turn, is a misnomer, because it falsely suggests cooperation between the two. In reality, Whorf gave an extreme form to an idea he learned from Sapir.

3 Most interestingly, we can take a glimpse into what it is like to start perceiving time differently from the following. Starting with mid-90s, the U.S.A. has been sending rovers on Mars to collect information. N.A.S.A. engineer for rover *Curiosity*, Nagin Cox, describes in a TED Conference (see Bibliography) what it is like to live on Earth non-stop and work on Mars from 9 to 17. A fundamental problem that was never anticipated arose from the difference in duration between one terrestrial day and one Martian day: a day is the time a planet takes to rotate once around its own axis, and Mars needs 24 hours and approximately 40 minutes to do that. Therefore, a Martian day is longer than ours by 40 minutes. For the team of scientists to be able to obey a fixed 8-hour Martian workday program (in its ‘off’ hours, the rover is inactive because the engineers change its program providing instructions for the next day), they go to work at 8 a.m. in the first day, at 8.40 a.m. the second day, at 9.20 the third day, at 10 a.m. the fourth day and so on, every day 40 minutes later than the previous one. Nagin Cox gives amazing details about the consequences of behaving as if you were on Mars, that range from the simple necessity for each member of the team to wear two wrist watches (one set for the terrestrial time and one for the Martian time) all the way down to psycho-somatic disturbances and disruption of human circadian rhythm induced...
by distortions of the concept of time, that makes periodical team replacements imperative.

4 The phenomenon happens on our planet, too. Some African peoples have clicks of the tongue as distinctive consonants in their inventory of phonemes. We hear them as biological sounds, not as linguistic sounds since they do not correspond to any of our own phonemes, hence to any mental representations that we have.

Biographical note
Laura Carmen Cutitaru is currently teaching English language and linguistics as Associate Professor with the Department of English Language and Literature at the “Alexandru Ioan Cuza” University of Iasi, Romania. She translated six books (Frederick Kellogg, O istorie a istoriografiei române; Frederick Kellogg, Drumul României spre independență; Ion Popescu-Sireteanu, The Town of Siret and Its Environs; NicolaeDascălu, Pilgrim in Iași; Virgil Nemoianu, Postmodernismul și identitățile culturale. Conflicte și coexistență; Charlie Chaplin, Un comic vede lumea), and authored three (Elements of Psychology and Pathology of Language, 2007; Naratorul la rampă. O incursiune în poetica jamesiană, 2012; Creierul gramatical, 2017).