James Cameron's Avatar is about to become the most viewed film in history. While Cameron may deserve this success for his special effects and breathtaking landscapes, Pandora, the world he has created, may seem rather disappointing. It is situated several light-years away from Earth but it looks very much like our world: There are trees, and grass, as well as predators and preys, birds and monkeys and, above all, the aliens called the Na'vis are just like us, except for a blue skin and a long tail (they even have breasts for those who read Playboy for the articles). They also have language, rituals and so on! One may ask: Why such a lack of imagination? Why create a whole encyclopaedia if it is for re-inventing the Earth?

Actually, I may be unfair with Cameron. After all, the convergences between the Earth and Pandora make sense from an evolutionary point of view. Indeed, there are good reasons to expect that life on others planets might evolve as it did on Earth. Everywhere in the universe, living beings would face similar evolutionary problems: They need energy, detectors, and computational systems. And everywhere in the universe, they will discover the same solutions exactly as, on Earth, the same tricks (enzymes, sex, eyes, etc.) have been discovered again and again by different species (see for instance Conway Morris's wonderful book about convergences; see also our old reader at alphapsy).

So far, so good for the biology (as for the physics, see here for the floating mountains!). Everywhere, life is likely to re-invent photosynthesis, sex or echolocation. But what about cognition and culture? Can we expect aliens to be so humanlike? I see no good reasons to be sceptical about the Na'vis' cognition.

In his article "Do extraterrestrials have sex (and intelligence)?", Jerome Barkow argued that intelligent beings need an intuitive physics to make tools, a theory of mind to understand others, a moral sense to cooperate and so on. Actually, some cognitive convergence can be found right here on Earth (see for instance Emery and Clayton's article on cognitive convergences between crows and apes).

And what about culture? Cameron seems quite proud of having recruited a linguist, Paul Frommer, to create a brand new language for the Na'vis (here is the grammar, the phonology and a part of the lexicon). This idea might sound a bit naive, but why not? Again, aliens should face the same constraints while communicating with others and they might well discover similar solutions. In a recent article about language universals, Nick Evans and Steve Levinson have described languages as

"…evolutionarily stable strategies, local minima as it were, that are recurrent solutions across time and space, such as the tendency to distinguish noun and verb roots, to have a subject role, or mutually consistent approaches to the ordering of head and modifier (…). These tendencies (…) result from myriad interactions between communicative, cognitive, and processing constraints which reshape existing structures through use."

It does not seem irrational then to expect alien languages to have such things as "subjects" for subjects are a very powerful tool to solve linguistic problems. As Evans and Levinson write:

"The device of subject, whether in English, Warlpiri, or Malagasy, is a way of streamlining grammars to take advantage of the fact that three logically distinct tasks correlate statistically. In a sentence like "Mary is trying to finish her book," the subject "Mary" is:
(a) a topic – what the sentence is about;
(b) an agent – the semantic role of the instigator of an action;
(c) the "pivot" – the syntactic broker around which many grammatical properties coalesce

Having a subject relation is an efficient way to organize a language's grammar because it bundles up different sub-tasks that most often need to be done together."

Note that the universality of cognitive constraints on the cultural evolution of languages is fully compatible with the variability of human languages, for each language has its own history and its own ecological constraints.

I won't go further in this direction but I guess that we could make similar claims for rituals as, all around the world, human rituals has evolved under the pressure of the same cognitive constraints.

My only reservation is about the cognitive device that allows Na'vis to mentally control animals and plants. I can't see any evolutionary good reason for such a symbiosis. But since it allows the characters to drive horses, pseudo-lions and pterodactyls, I can't really blame Cameron…