**Resumo do artigo de**

**Emma G. Flynn, Kevin N. Laland, Rachel L. Kendal and Jeremy R. Kendal (2013)**

**“Developmental niche construction”**

The authors introduce the concept of Niche Construction Theory (NCT) by defining it as a body of conceptual and formal theories considering that organisms modify their biotic and abiotic environment throughout their life, and that these changes have a causal impact on their evolutionary trajectory. Besides the ecological, biological and evolutionary pertinence of this perspective, the authors also believe that NCT could enrich and be enriched by adjacent disciplines such as developmental psychology. To illustrate their view, they expose that NCT evolves at an ontogenetic timescale in addition to the phylogenetic one, and that learning abilities and development in humans may be of considerable importance in extracting knowledge from niche construction, further impacting their life and evolution. The authors differentiate three distinct but interacting levels of information-acquiring processes: population genetic, development and culture. The cultural process underlies language, teaching, and prosociality, among others, participates in the creation of artifacts and overall shapes the learning opportunities and developmental trajectories of recipient organisms. From this postulate, the authors develop the idea of developmental niche construction which posits that culturally pertinent information is transmitted between individuals through symbols and artifacts, and that it can be used to direct children and infants development, in a bi-directional process where children and infants can also use this information to direct their own development. Besides, this view paralleles the activity theory, which considers cultural and historical context, in understanding the pertinence of individually acquired knowledge. Interestingly, the authors also propose to extend the scale of the unit of analysis to the group, regarding niche construction as a multi-organism process with distributed cognitive abilities, enabling the organized individuals to learn to design and use artifacts that have evolved through the process of cumulative culture, and participate in cooperative activities. Lastly, they point to the importance of a more global environmental context in providing limited learning opportunities as well as limited learning skills, leading to differential attribution of meaning and interest between individuals. The authors conclude by offering promising directions such as the integration of neuroscientific perspectives in NCT, the modeling of ecological inheritance and its interaction with mechanisms of cognitive development over generations, and the interplay between socio-political environment and dispositional factors of individuals.

**Questões sobre o artigo de Resende B. (2019), pp. 32-48:**

**“Capítulo 2: Desenvolvimento motor, construção de nicho e nicho de desenvolvimento.”**

Now that we have been well introduced to the niche construction theory (NCT), this article is very interesting as it gives the opportunity to think in a more practical way of the theoretical implications. Indeed individuals interact with their environment which alter their evolutionary trajectory, and indeed individuals’ abilities are defined by more than their body and organs abilities. But how does this theory practically translate in animal behaviors?

It is interesting to illustrate the theory with the origin and evolution of tool use, at the individual lifetime scale. How do individuals learn to use new tools or techniques? One explanatory direction is the spontaneous exploration of the environment. But then it raises different questions. If animals are interacting with their environment through stimulation seeking and behavioral releasing (in the meaning of expressing behavioral sequences related to a stimulation), it seems that novel techniques or use of the environment leading to a beneficial outcome would result from serendipity. For instance, some sea birds hold seashells in their beaks while flying and drop them from a certain height in order to break their hard shell and eat them. They drop seashells in a special place with a stony floor and the height used is high enough to break shells depending on shell size, relative to its resistance, but not too high so that the bird has time to land and eat the mollusk before snatching concurrents. This behavior requires environment use and technique, yet, it is a possibility that it emerged by accident, with a bird dropping a seashell from its beak. However, the randomness of the action appears very relative. The bird carrying a seashell in its beak may be attributed with eating intentions, and although “breaking the shell with the power of gravity on hard soil” may not have been conceptualized this way by the animal, it seems reasonable to say that the environmental exploration was directed. This consideration would particularly illustrate that individuals are leading to their own innovation, in line with the NCT perspective where individuals are active components of evolution.

Nevertheless, it also raised the question of recognized benefits and recognition of causality. Besides successfully interacting with the environment, individuals have to create meaning about interactions, relate events that reached to the beneficial outcome and store the knowledge. It appears that considering individuals to be able to construct developmental niches underlies to recognize them a greater complexity than what we usually seem to do when we attribute them a passive role. The mechanisms do not need to be known or understood to be used but they still need to be related to an outcome. Such as when we touch the torchlight icon of our phone to produce light in the dark, we do not know how the relation between the finger contact and the light activation works, or how the light itself is produced, but we know that touching this restricted area will lighten our environment. Seabirds may already use their beak and their localisation to process food, such as pecking at a hardshell while standing. Therefore, the innovative behavior may already have cognitive disposition to be related to food acquisition such as “using my beak in a particular posture may render food available” and here, instead of closed-beak pecks in steady posture, the seabird would open the beak while in flying posture. Consequently, random and unsituated innovations may never be integrated in the behavioral repertoire of individuals because they would lack sense? Innovation shall only be considered in a kind of linear and step-by-step process where predisposition must already exist and be exploited in a different manner?

It is maybe also important to consider the substrate used to process food, which must be hard, such as stone, for pecking and for dropping. Indeed, the text stressed on the importance of considering the environment and not only on the individual state in understanding behaviors. The absence of large and plain stony areas would certainly have prevented the emergence of dropping behaviors. This environmental importance is very consistent with the observation of behaviors typical of a region, a population, a landscape, a climate or else. It stresses the importance of considering separately populations of organisms living in different contexts (social, historical, environmental) as much as animals living in wild or captive groups, even if they come from the same population. Indeed, the lack of such integrative perspective between organisms and related environments would lead to draw inadequate conclusions about wild animals based on laboratory experiments. The text makes me reflect on the indissociable nature of organisms and their environment. An organism extracted from its environment may be compared as an organ extracted from its organism? Even if lab experiments can find properties and interesting insights about lungs, it may not be possible to understand its complete ability and potential as long as it is not situated in an organismic perspective, with its position, spatial structure and interconnection for instance. Besides, lung properties may not yet be fully understood if they are not studied in a situated environment too, with air, fluids, alternative activity during food intake, etc.