It appears that body size seems to be a good predictor of trophic position (Williams et al., 2010)⁠ and plays a major role in structuring food webs (Cohen et al., 1993)⁠. However, most studies considering body size structure of food webs remain empirical (Gravel et al., 2013)(Barrios-O’Neill et al., 2016)⁠. Thus, a more general approach using concrete traits (i.e., body size) and valid for a wide range of species would allow a better understanding of the size structure of food web.   
 On the other hand, living organisms are constrained by the physical properties of the surrounding medium (Denny, 1993)(Denny, 2016)(Vogel, 1988)(Vogel, 1996)⁠. Physical properties of the medium (i.e., gravity, density and viscosity) affect the way organisms move and interact with each other. Since predation usually implies motion, these factors create mechanical constraints acting on predators (Howland, 1974)(Domenici, 2001)(Domenici et al., 2007)(Domenici et al., 2011a)⁠. These factors are ubiquitous, and their effects are related to size. Hence, incorporating mechanical constraints into models would lead to a better understanding of the size-based relationship between predators and prey, and even of the size-structure of food webs. Considering the link between the physical and the biological world would be a major improvement in our understanding of food web structure (Loreau, 2010)⁠.  
 A first, and essential, step would be to investigate how these factors affect the functional response. Hence, functional response (i.e., the relationship between prey abundance and predator consumption) is known to drive the feasibility of predator-prey interactions and the stability of the whole food web (Brose, 2010)⁠. A better understanding of factors driving the functional response would lead to novel insights on the study of food webs.   
 Since the pioneer work by (Holling, 1961)⁠, several models of functional responses were proposed. These models emphasized different features of predator-prey relationships, such as feeding saturation (DeAngelis et al., 1975)⁠, interference (Beddington, 1975)(Crowley and Martin, 1989)⁠, or interaction between predators (Wasserman et al., 2016)⁠. Moreover, many studies have shown that functional response is strongly affected by the body sizes of predator and prey (Aljetlawi et al., 2004)(Vucic-Pestic et al., 2010)⁠. However, the role played by the physical medium in constraining the functional response remains largely unexplored.  
 Previous studies that considered the surrounding medium usually focused on specific aspects of predation or on specific taxa (Domenici et al., 2011a)(Domenici et al., 2011b)⁠, or investigated specific aspect of the medium such as dimensionality (Pawar et al., 2012)⁠ or complexity (Barrios-O’Neill et al., 2016)⁠. However, the role played by the surrounding medium acting at the individual level on predator-prey relationship, driving the functional response, remains to be explored.

In a recent study, (Portalier et al., 2019)⁠ provided a biomechanical model that uses general laws of mechanics and well-known biological laws, all related to body size, to predict predator to prey interactions. This model fits data remarkably well (Portalier et al., 2019)⁠. The model provides a detailed mechanism for predation, where predators have to move for searching, capturing and handling their prey. Depending on the relative body mass ratio between a predator and its prey, the model predicts whether or not a predator would successfully contact and capture a prey, and what the energetic gain would be. Some elements computed by the biomechanical model can be used to parameterize a functional response. Hence, this model provides a novel method to parameterize a functional response based on individual traits, and using mechanical laws.  
 This approach merges size-related biological and mechanical constraints within classical predator-prey systems. Parameters in the model are related to predator and prey sizes, a trait that is commonly measured, which makes conclusions from the model easily testable. The real novelty is the fact that parameters of the functional response are not measured at the community level, but are derived from the individual (or species) level. Hence, classical parameters such as attack rate and handling time become emerging properties of the model.

Solomon (1949) first proposed the term “functional response” to describe the specific relationship between the number of prey present and the number of prey consumed over a given time interval, per predator. Although early functional response equations could qualitatively describe real predator-prey relationships, they were purely phenomenological (Gause, Smaragdova & Witt 1936; Ivlev 1961; Jassby & Platt 1976). Such phenomenological descriptions eventually gave way to mechanistic models. Mechanistic functional responses incorporate independently measurable components that correspond to specific aspects of the predation process; such as the rate at which predators encounter and successfully attack prey items or the amount of time required to physically manipulate and consume captured prey (Murdoch 1973).

The most commonly used mechanistic functional responses are the Holling type 1, 2, and 3 functional responses (Holling 1959; Holling 1966; Jeschke, Kopp & Tollrian 2002)

* Many empirical studies nowadays: fit parameters on data (a posteriori), not predictive and not mechanistic