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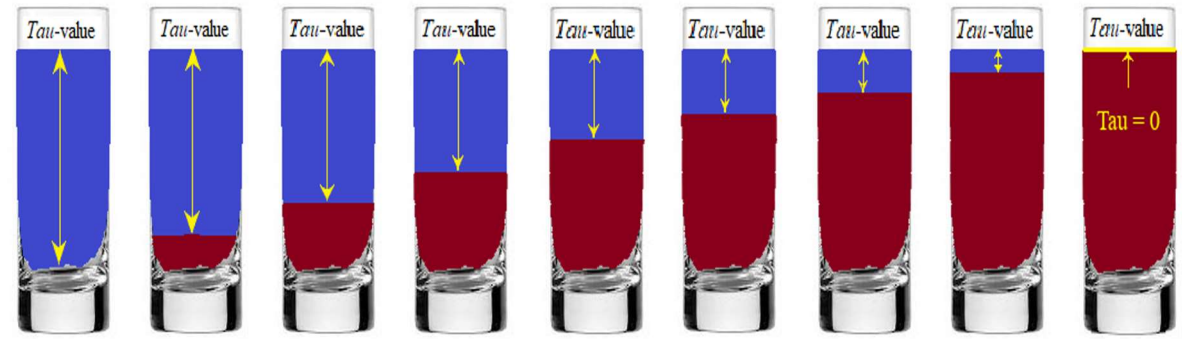


Caught In A Line
The explanatory model of all motoric movement actions

N.J. Mol

Introduction

Traditionally, science has assumed that one motor action corresponds to one focus. This assumption was likely so intuitive that it was never challenged. However, this has led to the situation where, even after more than 100 years of movement sciences, a plausible explanation for the underlying functional perception processes guiding the execution of all motor actions had never been found.
In contrast, in 2016, an explanatory model emerged that has the capability to identify all functional perception processes within any imaginable motor action. It demonstrates, beyond any reasonable doubt, that each motor action can only be executed through a mandatory coupling of two foci: an internal (secondary) focus that must always be directed towards an external (primary) focus. In which it should be explicitly noted that these two foci represent entities that fundamentally differ from current scientific terminology.
Regarding the external (primary) focus, it can be noted that science has thus far truly missed everything. Therefore, it will now be discussed comprehensively within a wide spectrum of motor actions, and this publication now unveils all aspects of the primary focus within the motoric movement action *pouring*. Pouring is a unique motor action because, like writing, the action trajectory shape becomes partially visible.

Solely the rising movement of the liquid level determines the essence of the task c.q. the external (primary) focus within the motoric movement action *pouring*

The category of motor actions discussed by the explanatory model pertains the conscious actions where it is assumed that there is always an initial formulation of an egocentric intent (an egocentric formulated will). Before picking up a coffee cup, for instance, there is always the desire to do so. The explanatory model of all motoric movement actions recognizes this as an undisputed factual aspect but adds a caveat. The egocentrically formulated intent does not, for example, concern picking up the coffee cup itself. The explanatory model reveals that this is factually incorrect and that we can only move our fingertips toward the coffee cup. Therefore, the movement of the fingertips toward the coffee cup constitutes the essence of that action. In the present action, we may indeed want to quench our thirst, but the egocentrically formulated goal is solely to raise the liquid level in the glass. Only that fact

determines the essence of the task, and therefore, only that fact should be considered as the external (primary) focus.

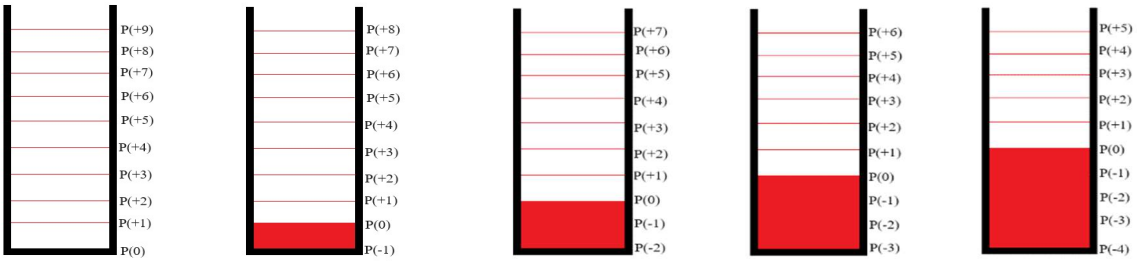
The tactical movement action (TMA) in relationship to pouring

Images: Firstly, an egocentric intention must be formulated that we want to quench our thirst and that we want to fill a glass. Subsequently we then create a perceptual image of a latent action trajectory shape outlining how we will let the liquid level rise. This occurs as part of a tactical action where two important objectives are considered. Firstly, it must lead to a successful action, and additionally, ecologically evolved organisms aim to execute actions as parsimonious as possible. Pouring actually involves the formation of two action trajectory shapes. The first action trajectory shape concerns the transition of the liquid into the glass, and the second action trajectory compels the rise of the liquid level in the glass. This publication focuses solely on the rise of the liquid level c.q. focuses solely on the essence of the task.

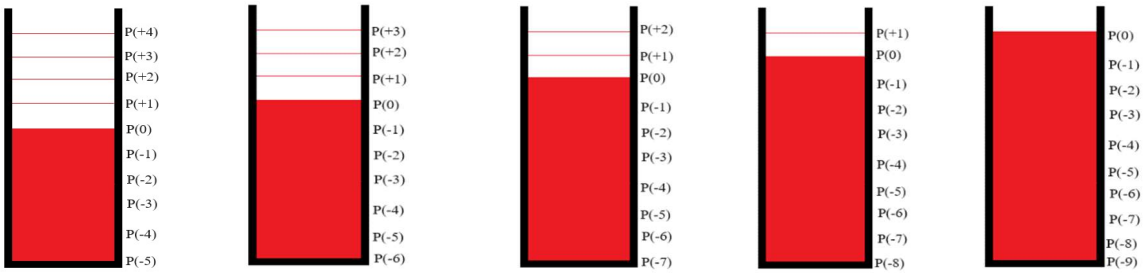
The explanatory model of the motoric movement action demonstrates that after formulating an egocentric goal, we always engage in a tactical consideration[1], prior to any execution, to determine how we can bring the action object to the goal location within successive positions P. In the context of the discussed action, we always create a perceptual image of a latent action trajectory shape, allowing the liquid level to rise successfully.

The factual movement action (FMA) within pouring

After determining a perceptual image of a latent action trajectory shape, we proceed to actually perform the action, and this begins with bridging the gap from the current position P(0) of the liquid level to the next position P(+1) within the action trajectory shape. Although, of course, we ultimately want to reach the edge of the glass, in that phase, the explanatory model clearly shows that our perception processes are solely focused on bridging the empty space between the bottom and the edge of the glass. On a micro-level, only positions P(-1), P(0), and P(+1) are important to us at that point.



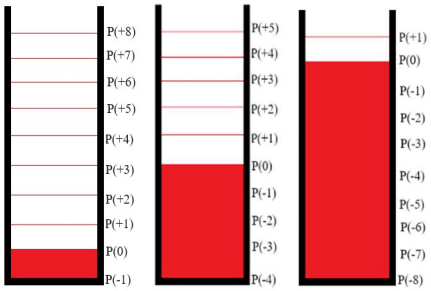
[1] The scientific evidence has been unequivocally provided for all grasping actions and all throwing actions, and can be easily universally extrapolated to any conceivable action. N.J. Mol; *Grasping encompasses two consecutive autonomous phases – The scientific proof that we tactically construct an action trajectory shape prior to the factual execution of that exact same action trajectory shape.*



Images: In an animation, the progression of an action trajectory shape can be depicted as follows. Within any conceivable action, the action object c.q. the liquid level can successfully execute an action only by first occupying the next position P(+1) within the action trajectory shape. The current position P(0) then shifts one place upward, and a manifest position P(-1) is added. This process continues with each new position P(0) until the end of the action trajectory shape is reached. To comprehend the perception processes at the most fundamental level it is of the utmost importance that you start to understand that the latent part of the action trajectory shape will factually need to sprout out of the already manifest positions P(-x).

The perception-action coupling within pouring

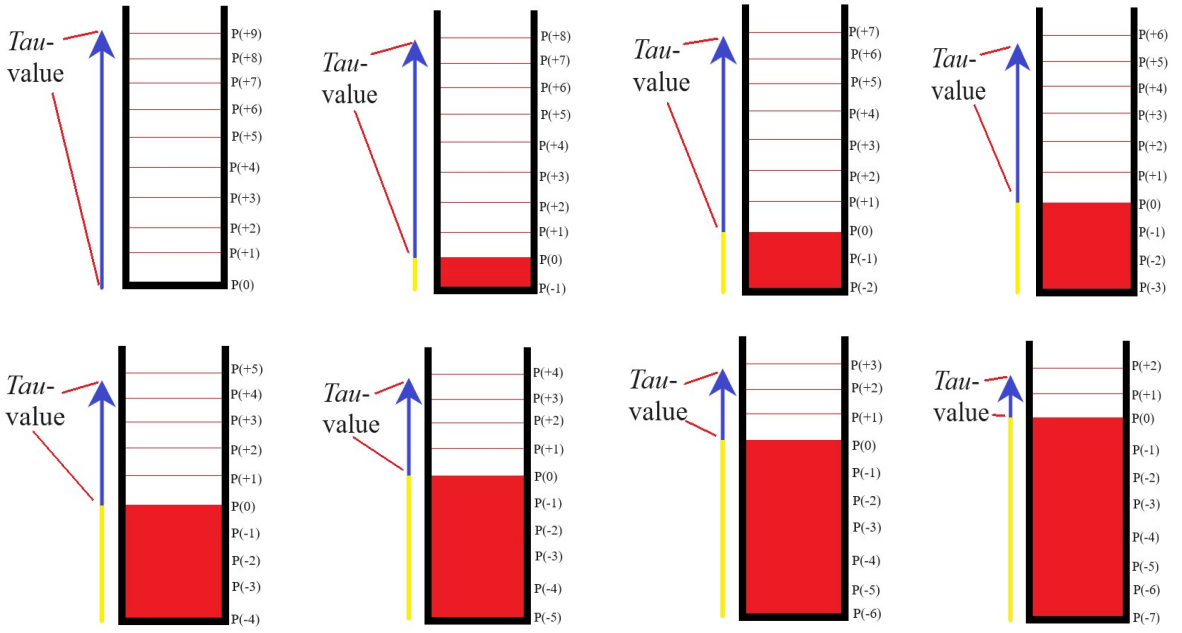
With the preceding argumentation, the explanatory model of the motoric movement action now provides a comprehensive and universal explanation of how perception is linked to action within any conceivable task. The animations in the previous section illustrate that the action object maintains a fixed relationship with the perceptual image of the action trajectory shape. This becomes easier to comprehend when envisioning a marble in a marble run. In this analogy, you will become much more aware that the perception-action coupling is a unified phenomenon where only a single change occurs every ongoing time span. Within the marble run it becomes quite visible that during the actual execution, each position P(0) serves as the precise separation between all already manifested positions P(-x) and the latent positions P(+x) yet to be traversed.
Through this explanation of the perception-action coupling, the explanatory model can precisely demonstrate how organisms must have evolved within an ecological framework. However, delving into this subject exceeds the scope of this publication. Instead, several crucial points will be highlighted concerning the functional perceptual processes within this motor action.
It is essential to recognize that while the ultimate goal involves reaching the edge of the glass, during the execution of the action, we are only occupied with bridging empty space where apparently *nothing* (!) is happening. Within any conceivable action, it can be observed that one spends relatively more time bridging the void than there seems to be any actual activity taking place. However, the explanatory model makes it abundantly clear that in pouring, not only the end goal is significant but also that all positions P between the bottom and the edge of the glass are equally important.
Additionally, it should be noted that the action can be clearly perceived within the perceptual image, but there is no fixed unit of time that can be associated with it. Each unit of time can be divided into a thousand smaller units, and these units can be further subdivided, leading the explanatory model to argue that the action at P(0) fundamentally takes such a brief time span that it only gains significance in relationship to perceptions of the adjacent time frames. In other words, perceiving the actual position of the liquid level solely gains meaning through the adjacent future "actual" positions P(+x) and the adjacent manifest "actual" positions P(-x) of the liquid level. Within which the overarching idea is to emphasize that perceptions within any conceivable action mainly pertain to one single phenomenon wherein the perception of the action also compels a perceptual image, but primarily that they are absolutely interdependent.



Images: In many motor actions, the action trajectory shape will not become visible, making it often challenging to form an understanding of the perception-action coupling. Pouring and writing make it somewhat easier because the manifest part of the action trajectory remains visible. However, the perceptual image of the latent part remains invisible. On the contrary, in the case of a marble in a marble run, this phenomenon is very clearly visible. It clearly showcases one single phenomenon wherein the marble, at each position P, delineates the precise separation between all already manifested positions P(-x) and all latent positions P(+x). Additionally, it exemplifies one of the essences of the coupling. If we couldn't see the marble run, the movements of the marble would lack essential context, and conversely, without the marble, we would be completely unable to perceive any coupling as well. There is a compelling interdependent relationship, and without that coupling, we would never, under any circumstances, be able to execute any motoric movement action.

The *tau*-value in relationship to pouring

The explanatory model of the motoric movement action, in conjunction with the perception-action coupling, demonstrates that the perception of each position of the liquid level c.q. the action object within the action trajectory shape is equally important. However, when the liquid level approaches the end of the action trajectory shape, the task or the egocentrically formulated will is about to be finalized. In every conceivable action, the action object progresses through the action trajectory shape in a universal manner until there are no latent positions P left. Within his *tau*-coupling theory, D.N. Lee referred to this as approaching the *tau*-value to zero.



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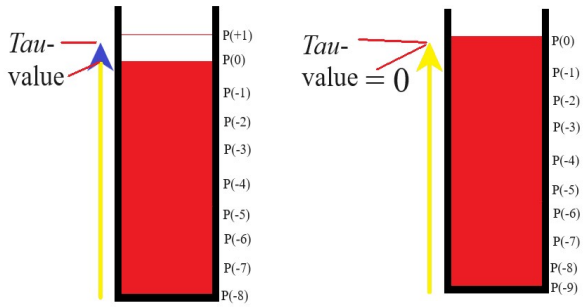
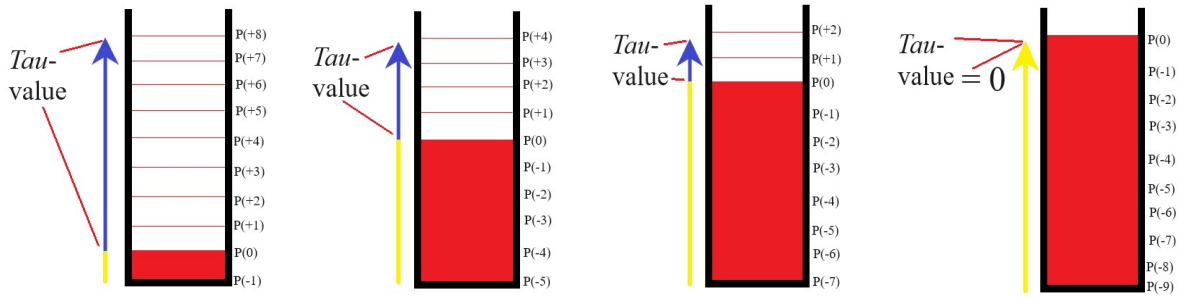


Images: Within the perception-action coupling, the liquid level will traverse all latent positions P that are tactically predetermined within a perceptual image of an action trajectory shape. With each successive position P of the liquid level, the *tau*-value will decrease, until it eventually approaches zero c.q. becomes zero.

The perception of the *tau*-value within pouring

The perception of the *tau*-value within the external (primary) focus is an essential process because, within a strict *tau*-coupling, it must establish a compelling relationship with the internal (secondary) focus to make an action successful. When it is observed that the liquid level is approaching the edge of the glass, the perception within the secondary internal focus c.q. the perception of the movements of the bottle, must ensure that the bottle is slowed down and tilted back in a way that decelerates the rise of the liquid level and brings it to a precise stop.



Images: When you fill a glass, you can perceive how the *tau*-value approaches zero in two ways. On one hand, from the perspective of the liquid, you can observe how the fluid gradually occupies the latent positions P within the action trajectory shape. Then you primarily focus on how the red block, or the red action trajectory shape, develops. On the other hand, in a much more fundamental way, from the perspective of the empty glass, you are capable to perceive how the emptiness inside the glass gradually disappears. Then you mainly observe how the white block vanishes, or how the white positions P of the latent action trajectory shape disappear. Essentially, then you only perceive how the latent white *gap* (conform Lee) closes.

Perceiving the *tau*-value approaching to zero can be observed in two autonomous ways. The first way involves filling in the perceptual representation of the entire latent action trajectory shape with the manifest positions P of the liquid level. In animations, this should be depicted as the yellow line taking over or filling in the blue line. The other way involves a much more fundamental way of perceiving the *tau*-value. In contrast to the first way, this is solely based on the disappearance of the latent positions P from the perceptual representation of the entire latent action trajectory shape. Which means that you solely observe with what speed the blue line disappears.