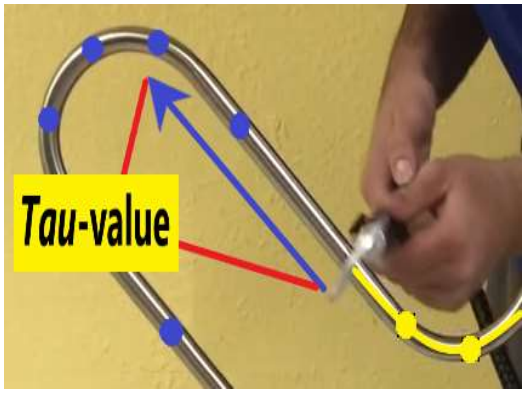
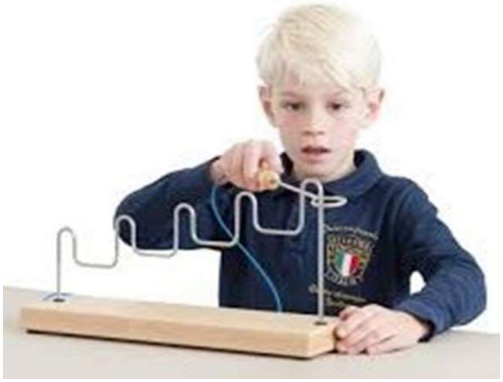
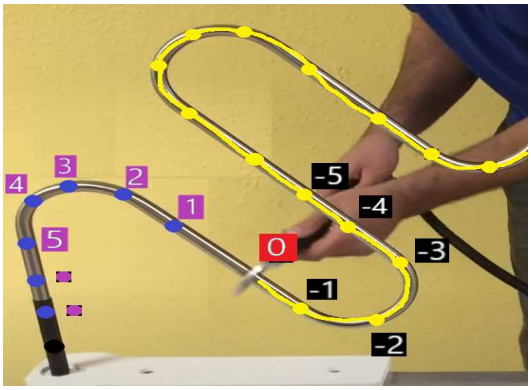
Within the nerve spiral the essence of the task is solely executed by the movements of the ring; Within the primary focus the ring moves like a marble in a marble run producing the *tau*-value







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 truly missed everything until now. Therefore, within a wide spectrum of motor actions, it will now be comprehensively discussed, and this publication reveals all facets of the primary focus within the motor movement *action nerve spiral*[1]. This action is exceptional for several reasons. It is a game where the sole objective is to move a ring attached to a rod from point A to point B along a predetermined action trajectory shape. The (iron) ring must not touch the (electrically charged) spiral, or else a bell rings, and you lose the game. This shares similarities with writing because the action trajectory shape becomes visible, and it requires the precise execution of the entire trajectory, not just the final part. It also resembles actions like eating, where a spoon attached to a handle must be moved over an action trajectory shape.

What the motor action nerve spiral primarily demonstrates is that we absolutely cannot produce straight action trajectories. Future publications will convincingly demonstrate that traversing any action trajectory shape can only be achieved with the involvement of the cortical streams. In a double and mutual process, the ventral and dorsal stream must collaborate to mediate the perception-action coupling in any conceivable action. Due to the short reaction time involved in this mediation, the action object will always exhibit jerky progress. Which is so persuasively present within the nerve spiral and feels like scientific evidence.

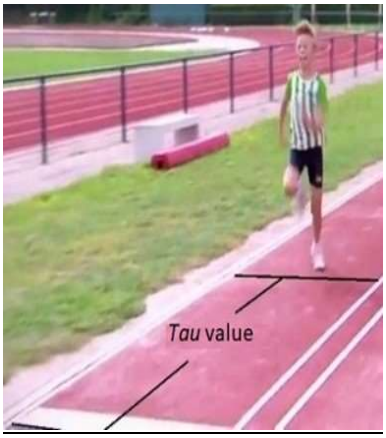
This publication aims to clarify that we even construct a perceptual image of an action trajectory shape, even if there appears to be a plastic spiral in front of us. In the case of the nerve spiral, the action trajectory shape consists of continuous or contiguous positions P of only the ring, and only the movement of the ring within that action trajectory shape provides the essential *tau*-value which must be coupled to the secondary (internal) focus. This should also serve as evidence that this phenomenon occurs within any conceivable action.

[1] https://www.youtube.com/watch?app=desktop&v=-BqjwDS6awM

Solely the movements of the ring encompass the essence of the task c.q. the external (primary) focus

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 context of the game related to the nerve spiral, we may indeed have a strong desire to win. However, the egocentrically formulated goal pertains solely to moving the ring from the beginning to the end, covering all positions P of the spiral. Only this aspect determines the essence of the task, and therefore, only this aspect should be considered as the external (primary) focus.

The tactical movement action (TMA) in relationship to moving a ring along a nerve spiral



Images: Firstly, an egocentric intention must be formulated that we want to move a ring from A to B over a nerve spiral. Next, from the current position of the ring, a perceptual image of a latent action trajectory shape is created how we will reach the end of the spiral. 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. -
In the case of the nerve spiral and in for example long jumping, it might appear as though the action trajectory shape is already formed due to the contours of the task, and that there is no need to further construct an action trajectory shape within that. This is an utter misconception. Even if there is a more or less defined path laid out for us, we still egocentrically construct an action trajectory shape out of the perspective of the action object. Which is notably evident in for example high jumping, when no visible approach is laid out. So this process also occurs within long jumping and in the case of the nerve spiral we also anticipate potential future problems which we will encounter.

The explanatory model of the motoric movement action demonstrates that after formulating an egocentric goal, we always engage in a tactical consideration[2], 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

[2] 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.*

discussed action, we always create a perceptual image of a latent action trajectory shape, allowing the ring to be moved successfully from A to B.

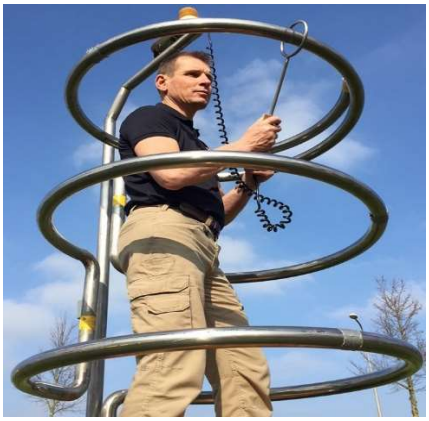
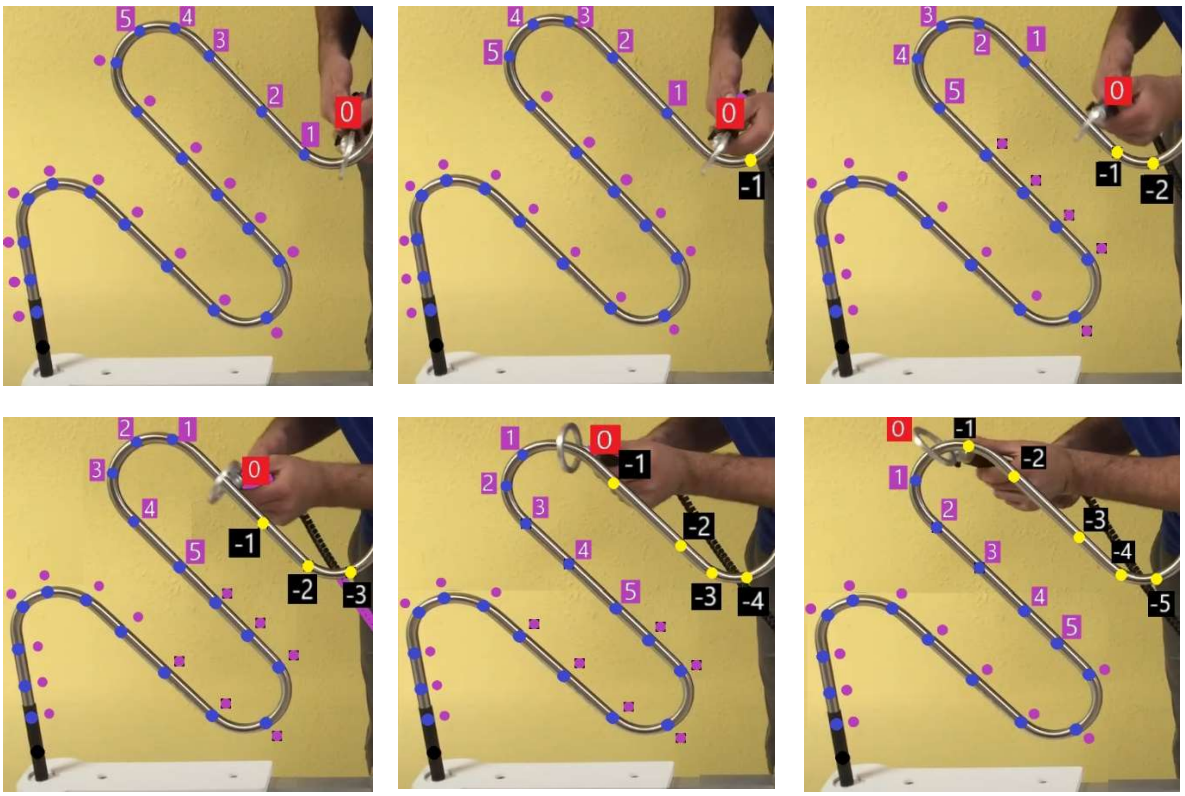


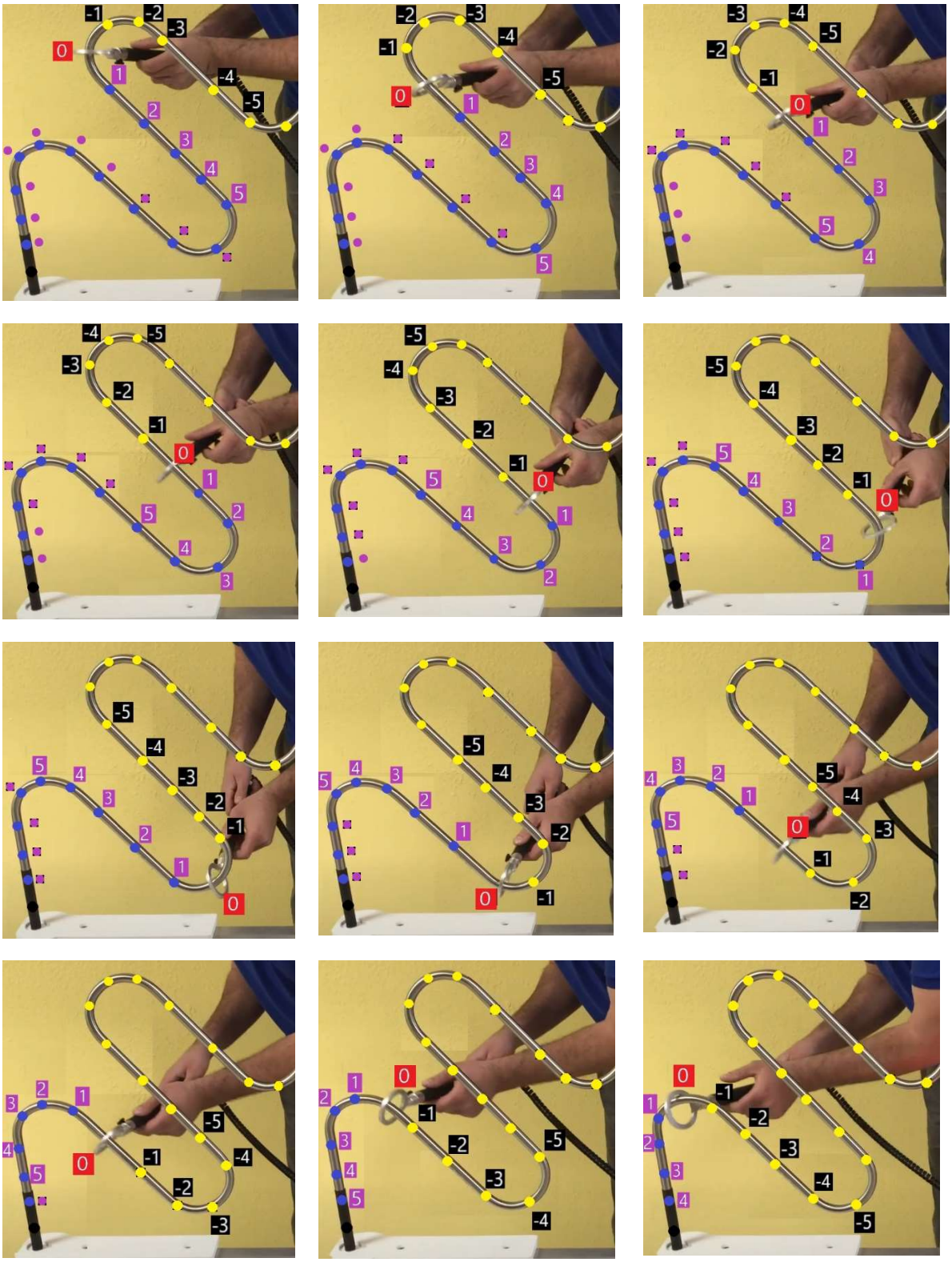
Image: In the execution of the nerve spiral, it may appear that the action object is the ring. However, that is not entirely accurate. You can clearly observe that we are merely moving the open space *within* (!) the ring from A to B.

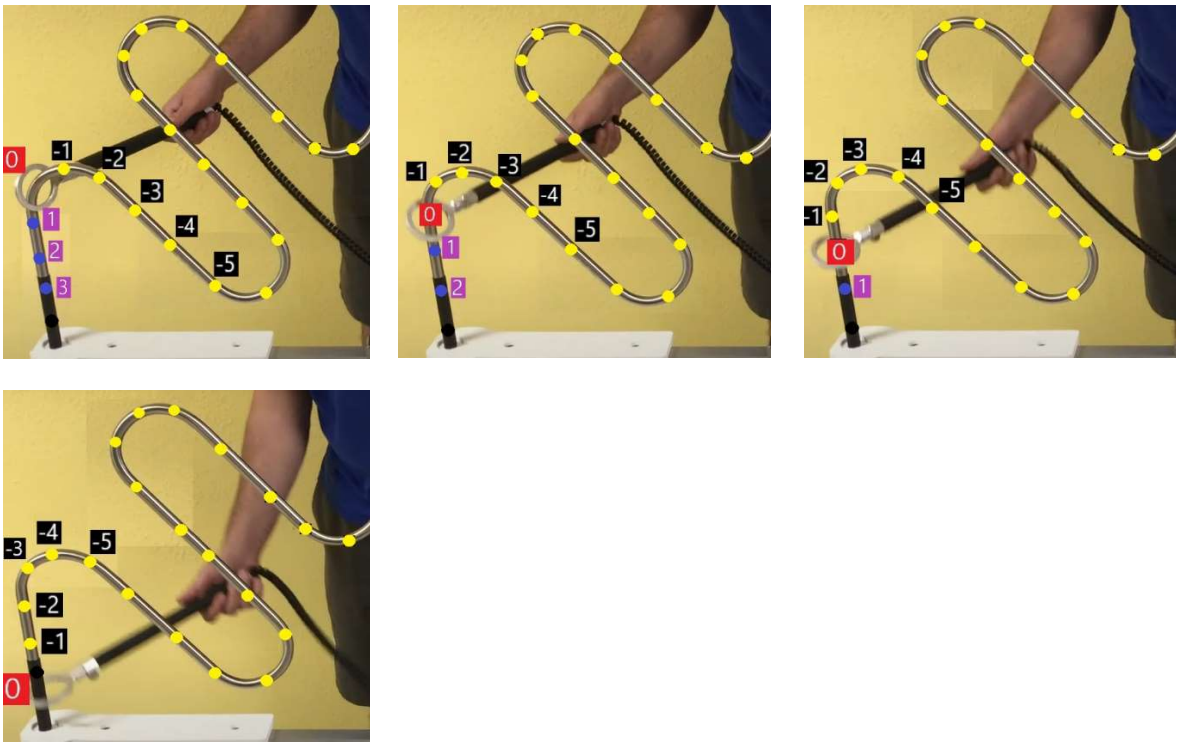
The factual movement action (FMA) in relationship to the movement of a ring along a nerve spiral

After determining a perceptual image of a latent action trajectory shape, we proceed to actually carry out the action. This process effectively starts with bridging the gap from the current ring position P(0) to the next position P(+1) within the action trajectory. Although our ultimate intention of course is to reach the end of the spiral, the explanatory model clearly demonstrates that our perception processes in this phase are solely focused on traversing the space *between* (!) A and B. Which at a micro-level shows, that essentially only the positions P(-1), P(0), and P(+1) matter to us during this bridging process.



Within eating the essence of the task is solely executed by the movements of the spoon toward the plate and the mouth; Within the primary focus the spoon is constrained in a script of two autonomous action trajectory shapes producing two autonomous *tau*-values



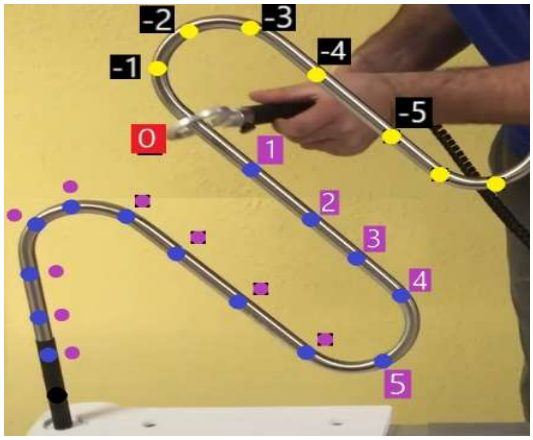


Images: In an animation, the progression of an action trajectory shape can be depicted as follows: Within any conceivable action, the action object can only successfully execute the action by first entering the next position P(+1) within the action trajectory shape. The current position P(0) then shifts one place forward, 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.

The perception-action coupling in relationship to the movement of a ring along a nerve spiral

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's imperative to recognize that while the ultimate goal is to guide the ring to the end of the spiral, during the execution of the action, we are solely engaged in bridging (lots of) space between A and B. It can be observed within any conceivable action that we spend relatively more time bridging this gap than with the end goal itself. The explanatory model, however, unequivocally shows that not only the end goal matters, but all positions P between the beginning and the end of the spiral are equally significant.
Additionally, it must be remarked that the action of the ring at P(0) can be perceived distinctly, yet no fixed unit of time can be attributed to 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 current ring position solely gains meaning through the adjacent future "current" positions P(+x) and the adjacent manifest "current" positions P(-x) of the ring. 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: Within many motoric actions the action trajectory shape will not become visible, making it challenging to depict with animations. Conversely, the marble within the marble run, is capable to vividly illustrate this concept. 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[3].

In many motor actions, the action trajectory shape remains invisible, making it challenging to conceptualize the perception-action coupling. However, with the nerve spiral and the marble run, this becomes more accessible because both present a compelling action trajectory shape. They both illustrate a phenomenon in which the action object (marble/ring) marks the precise boundary at each position P between all the already manifest positions P(-x) and all the latent positions P(+x). Furthermore, they reveal one of the essentials of the (perception-action) coupling. If there were no marble run or nerve spiral to observe, the movements of the action object would lack a framework. Similarly, if there were no action object to observe, we couldn't perceive a coupling either. Thus, without each other, they hold no significance at all.

The *tau*-value in relationship to the movement of a ring along a nerve spiral

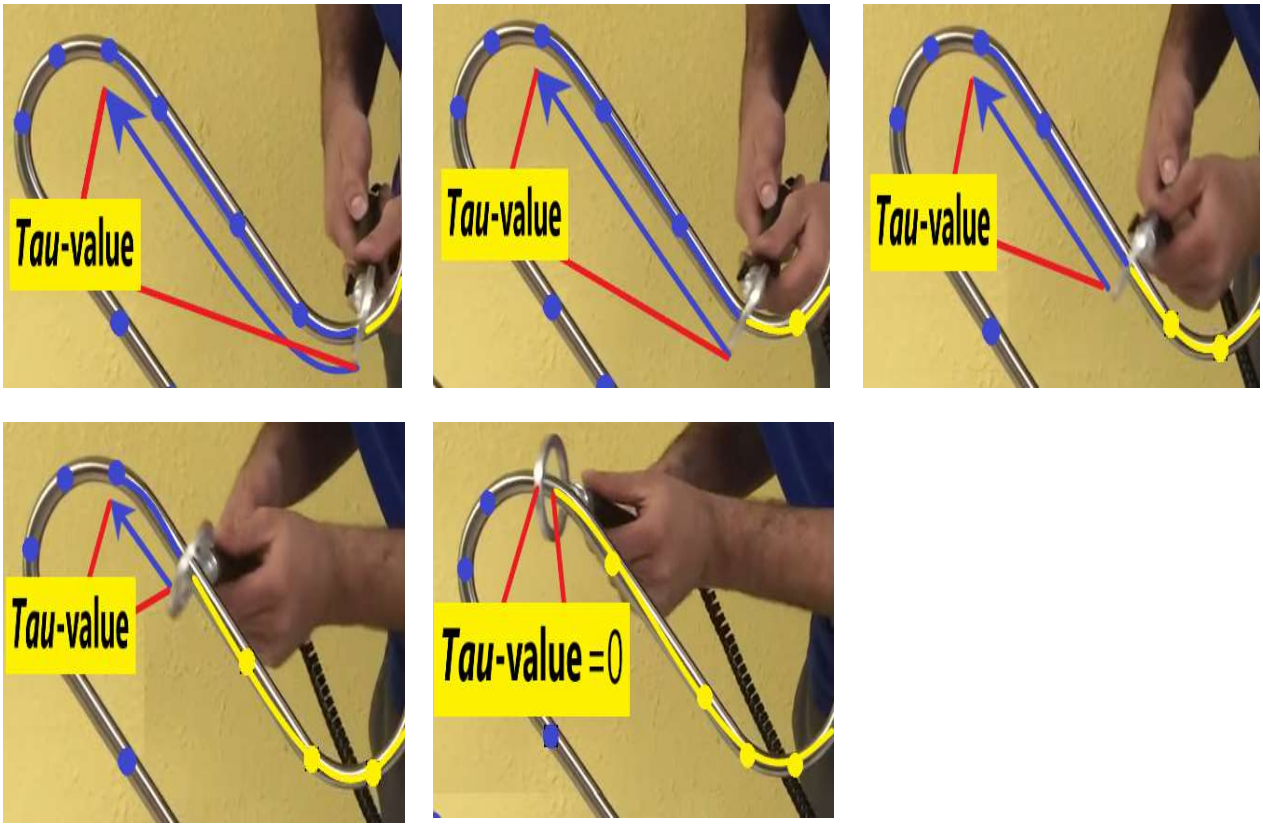
The explanatory model of the motor action demonstrates through the perception-action coupling that the perception of each position of the ring c.q. the action object within the action trajectory shape is equally important. This is vividly illustrated in the nerve spiral.

[3] The marble run provides a significant clarification of the perception-action coupling. However, what it suggests must be adjusted, as the reality is slightly different. Due to the inherent and rigid structure of both the marble run and the nerve spiral, the perceptual image of the latent action trajectory that we construct won't differ much from the actual form we see in front of us. However, in reality, factually no manifest positions of the ring or the marble will remain visible. Which conversely is the case within motoric actions like writing or pouring.

In most motor actions, the primary objective is mainly to reach the end of the action trajectory. Upon achieving this, the task is completed, and the egocentrically formulated intention is concluded. At this point, the entire latent action trajectory is populated with manifest positions P, leaving no latent positions. Within his *tau*-coupling theory, D.N. Lee referred to this phenomenon as the closing of the gap c.q. as the *tau*-value approaching to zero.
However within the nerve spiral game, due to the extremely small ring-to-spiral ratio, the natural mediation process of the cortical streams, which must process the double and mutual observations of the ring in relation to the spiral, falls short. Consequently, the entire execution of the nerve spiral encompasses, in principle, one ongoing *tau*-coupling. A detailed explanation of this process is omitted here, and we will suffice with mentioning four notable *tau*-values that arise within alone a part of the nerve spiral.

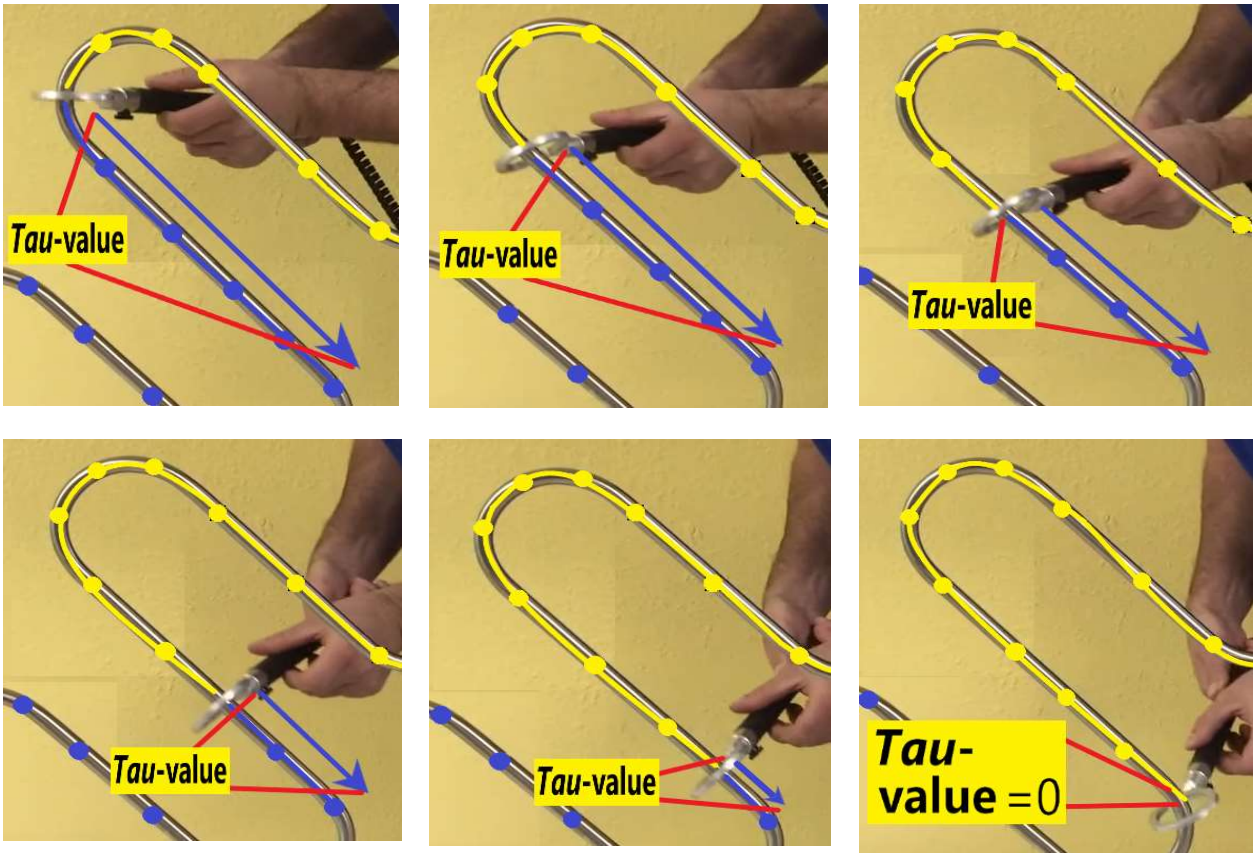
Tau-value 1

Within the perception-action coupling, the ring will traverse all latent positions P that have been strategically determined within a perceptual representation of an action trajectory. With each successive position P of the ring, the *tau*-value will decrease.



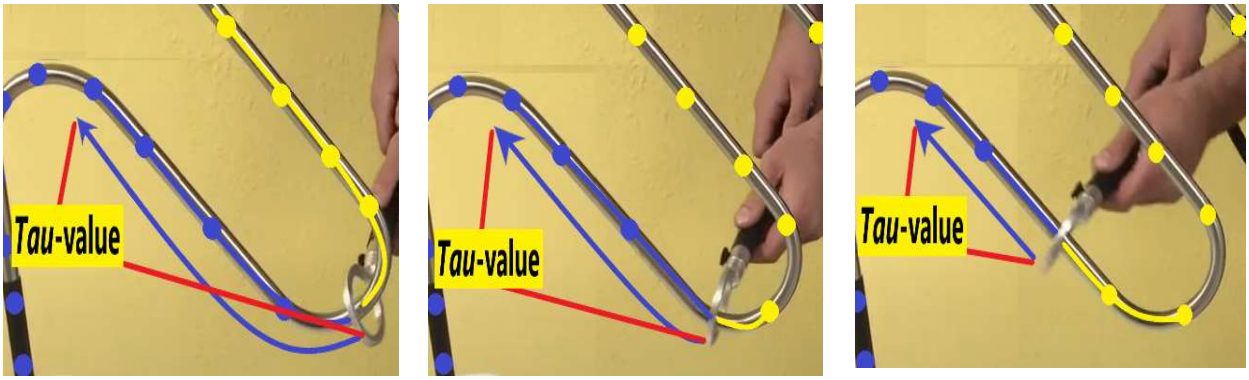
Images: From the moment we begin the execution of the nerve spiral, the ring first traverses a straight part of the action trajectory shape upward until a bend occurs. At that point, it becomes crucial to observe the *tau*-value for the first time as it approaches zero. The first straight portion is relatively easy to navigate with a not-changing shape of the ring. However, when the curve is reached, the shape of the ring must be adjusted very precisely to match each subsequent position within the spiral. The *tau*-value can be observed in two autonomous ways. You can observe how the manifest (yellow) positions P of the ring take over the latent (blue) action trajectory or, at an even more fundamental level, you can observe the speed at which the latent part of the action trajectory disappears. In essence, then you are only perceiving how the latent (blue) "gap" closes.

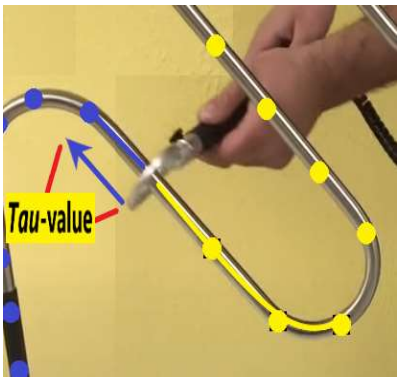
Tau-value 2

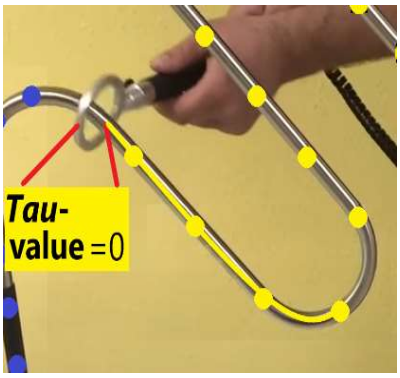


Images: Each position P of the first bend must be traversed very carefully because during the movement, the ring must also be rotated accordingly. However, after the bend, there is another straight section, and the movement of the ring can be accelerated. Until the next bend, it becomes important for the second time that we perceive a *tau*-value and see it approaching zero because after that, the whole challenging process in the next bend repeats itself. The *tau*-value can be observed in two autonomous ways. You can observe how the manifest (yellow) positions P of the ring take over the latent (blue) action trajectory or, at an even more fundamental level, you can observe the speed at which the latent part of the action trajectory disappears. In essence, then you are only perceiving how the latent (blue) "gap" closes.

Tau-value 3

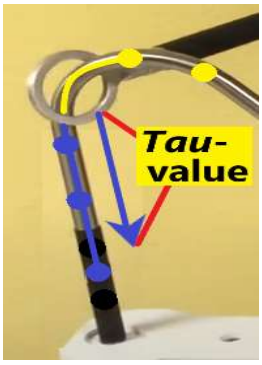


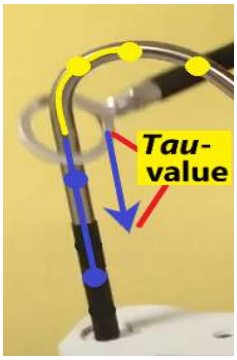


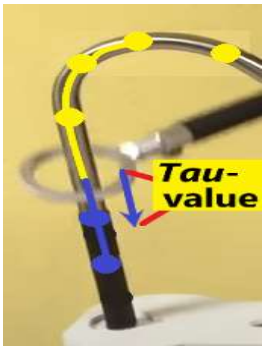


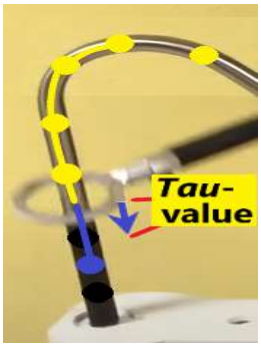
Images: The second bend must also be traversed very carefully because during the movement, the ring must also be rotated. However, after the bend, there is another straight section, and the movement of the ring can be accelerated again. Until the next bend, it becomes important for the third time that we perceive a *tau*-value and see it approaching zero because after that, the whole challenging process in the bend repeats itself. The *tau*-value can be observed in two autonomous ways. You can observe how the manifest (yellow) positions P of the ring take over the latent (blue) action trajectory or, at an even more fundamental level, you can observe the speed at which the latent part of the action trajectory disappears. In essence, then you are only perceiving how the latent (blue) "gap" closes.

Tau-value 4









Images: After the third bend, the final part is a straight section, and the movement of the ring can be accelerated again until the end of the spiral. At that point, the entire action is completed, and the ring will no longer be able to touch the spiral. The *tau*-value can be observed in two autonomous ways. You can observe how the manifest (yellow) positions P of the ring take over the latent (blue) action trajectory or, at an even more fundamental level, you can observe the speed at which the latent part of the action trajectory disappears. In essence, then you are only perceiving how the latent (blue) "gap" closes.