The function of the cortical streams – It appears a straight action path, but we can only guide a glass to a coaster with a zigzag movement

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

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https://www.explanatorymodel.nl/common-daily-actions/placing

Introduction

The explanatory model of the motoric movement action provides a profound understanding of all functional c.q. behavioural perception processes occurring within any conceivable motoric action. Nonetheless, challenges arise in its implementation within the scientific community, given the intrinsic nature of a new paradigm within a complex dynamic system. It necessitates the simultaneous integration of several innovative mind steps, including:

1. The scientific evidence that, as part of a tactical (ecological) consideration, we always first create a perceptual image of a latent action trajectory shape prior to the actual placing of a glass on a coaster.
2. The understanding of the necessity of a compelling collaboration between an internal and an external focus in every motor action. When placing a glass on a coaster the movement of the bottom of the glass within the action trajectory shape can only be perceived outside the body and is solely caused by perception of movement within the body[1]. Due to their exclusive domains these perceptions are incompatible.
3. The assumption of the crucial role of the movement of the bottom of the glass over the action trajectory shape as the essence of this task, wherein the external focus must be hierarchically considered primary. This assigns a secondary status to the internal focus and demonstrates that no motor plan is ever conducted.
4. The explanation of how the primary focus generates the *tau*-value and how the secondary focus needs to obediently follow the development of that *tau*-value within a strict *tau*-coupling process, providing the first ecological explanation for anticipating all unexpected events during an action.
5. The insight that it is a subjective choice when we move the bottom of the glass towards a coaster with for example arm action. With the same arm action, the wrist, knuckles, hand back, elbow, etc., also move in a unique action trajectory shape. This demonstrates that there is a causal relationship between the perception of internal and external movements when placing a glass on a coaster, but an explicit relationship only arises when we have (subjectively) "chosen" the bottom of the glass as the leading focus within this placing task.

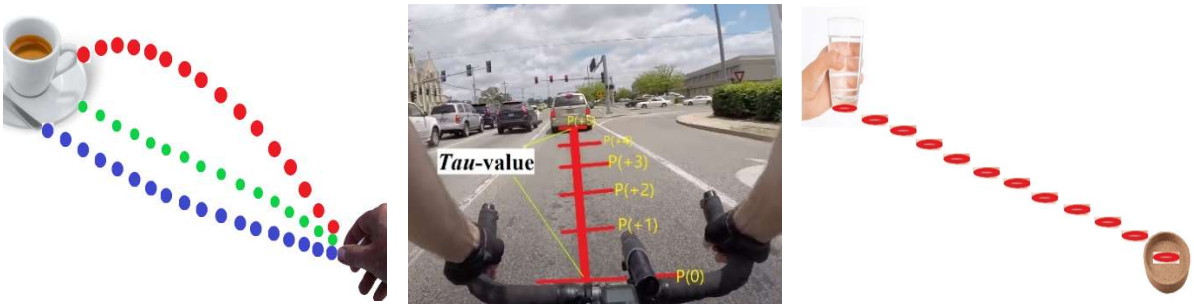
As a concluding step, this chapter clarifies the functioning of the cortical streams. It provides a comprehensive understanding of why they must play such a prominent role c.q. why an evolutionary need arose for them to occur, and additionally, it precisely explains how within each motor action, they mediate two autonomous processes, namely the zigzag process and the accordion process[2].

1 When placing a glass on a coaster, it becomes evident that the internal focus extends only to the portion of the glass gripped by the fingers. In most glass placing tasks this compels the sides of the glass. The bottom of the glass is solely constructing the external action trajectory shape and this means that the two foci concern two clearly different locations of the glass.

2 In previous publications, this has been referred to as the harmonica process.

1. The main goal of the tactical movement action (TMA) encompasses the construction of a perceptual image of a latent action trajectory shape between the current position of the bottom of the glass and the coaster

Supported by scientific evidence[3] the explanatory model delineates that the execution of any motor action involves two distinct sequential phases: the tactical movement action (TMA) and the actual movement action (AMA). The tactical movement action is focused solely on planning the upcoming action and must be finalized before any actual execution occurs. A crucial aspect of the tactical movement action is the creation of a perceptual image depicting the latent action trajectory shape between the current glass position and the intended target.
While the explanatory model aligns with existing scientific research, it also introduces a novel conclusion not yet acknowledged by the scientific community. It suggests that the creation of a perceptual image of the latent action trajectory shape between the glass and the coaster involves tactical consideration of whether the space between them can be bridged by a continuous line segment shape encompassing all glass dimensions. This proposition is substantiated by incontrovertible scientific evidence but one can empirically arrive quickly to the same conclusion[4].



Images: Within cycling and grasping we also construct a perceptual image of a latent action trajectory shape during the tactical movement action (TMA) like in any conceivable motoric action, over which *all dimensions* (!) of the action object (i.e., the bike and the fingertips) will enable the action to succeed. During the actual execution within the actual movement action (AMA), akin to the glass within a placing task on a coaster, one must perceive the movement of the action object during the bridging process, as only the bike, the glass, and the fingertips are going to move c.q. can be moved egocentrically. Within the images, it is particularly noticeable that we actively perceive whether the entire path through all dimensions of the fingertips, the bike, or the glass can be filled in a continuous action trajectory shape c.q. we mainly perceive the "nothingness" in the vista in front of us. Because only in that void there is (empty) space to successfully execute an action.

In addition to unveiling this novelty, it is also revealed that when the tactical movement action has been finalized, we are primarily going to focus on the movement of the (bottom of the) glass towards the coaster. This contrasts with the traditional perspective of science, which remains constantly focused on the coaster itself. During the actual movement action (AMA), our main concern is the egocentric bridging process of the (bottom of the) glass, guiding it over the perceptual image of the latent action trajectory shape which is exclusively determined during the tactical movement action. So when the factual execution starts the coaster itself is not any longer the focal point, but rather the movement

[3] https://www.researchgate.net/publication/372290282_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_trajector
[4] The action trajectory shape of the letter towards the mailbox will vary significantly when an obstacle like a large shopping bag is situated in front of the slit. Moreover, in scenarios where the mailbox is obscured by a substantial shopping window, no action trajectory shape can be formed at all.

of the (bottom of the) glass towards it c.q. the bridging of the void (!) between the current location of the glass and the coaster forms the essence of the action.
Another revolutionary novelty aligns with the previous thought. Although reaching the end of the action trajectory shape will eventually lead us to the completion of this task, the explanatory model, supported by scientific evidence, demonstrates that we also tactically determine beforehand whether the entire (!) space between the (bottom of the) glass and the coaster can be filled by a continuous line of all dimensions of the glass. This means that all positions P between the current location of the glass and the coaster are observed as actively and as crucially as the endpoint of the action trajectory shape. This realization provides a solid foundation for the fact that during the actual movement action (AMA), we are solely focused on traversing the latent positions P associated with the action trajectory shape. This implies that upon reaching position P(x), for example, somewhere midway along the action trajectory, we are mainly focused on the perception of three positions: position P(x-1), where we just came from, position P(x), where the glass is now, and position P(x+1), the perception of the next position where we need to move the (bottom of the) glass. In this phase, we are primarily engaged in the aforementioned bridging process and only monitor whether the gap between the (bottom of the) glass and the coaster is closing. This also reveals another essential ecological novelty, showing that during the actual movement action, we are indeed not concerned with the coaster itself, but only with reducing the number of latent positions P between the (bottom of the) glass and the coaster.

2. The reciprocal dependency between the internal and external focus results in absolute deviations of the (bottom of the) glass within the perceptual image of the latent action trajectory shape

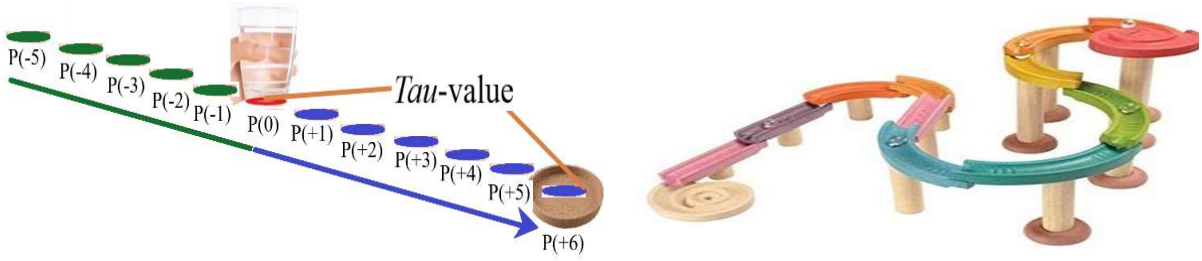
The explanatory model of the motoric movement action illustrates within the context of placing a glass on a coaster that two foci always arise. We can only guide the (bottom of the) glass along an external action trajectory toward a coaster with a focus on internal movements. These foci are autonomous because the (perception of) movements occur strictly separated inside and outside the body, rendering them incompatible.
However, as the explanatory model now demonstrates that the movement of the (bottom of the) glass within the external action trajectory shape is going to fulfil the essence of the task, an intriguing phenomenon of reciprocal dependency emerges. Only internal motor movements can lead the (bottom of the) glass externally along an action trajectory shape, yet the progression of the (bottom of the) glass within that trajectory will, as the primary focus, dictate those internal motor movements. The inevitable consequence of this observation encompasses that it is not a matter of whether the (bottom of the) glass will deviate within the perceptual image of the latent action trajectory shape, but rather that this is an absolute certainty. In which this absoluteness logically stems from the factual nature of the autonomous perception of both foci.

3. Within the actual movement action (AMA) the cortical streams will have to mediate the continuous flow of absolutely emerging deviations

If we now combine the two preceding paragraphs and proceed to actually place a glass on a coaster, our main endeavour will primarily become to initiate the bridging process of the (bottom of the) glass in which the perceptual image of the latent action trajectory shape serves as an open yet compelling guiding[5] phenomenon. This means that we aim to *step by step* (!) reduce the distance between the

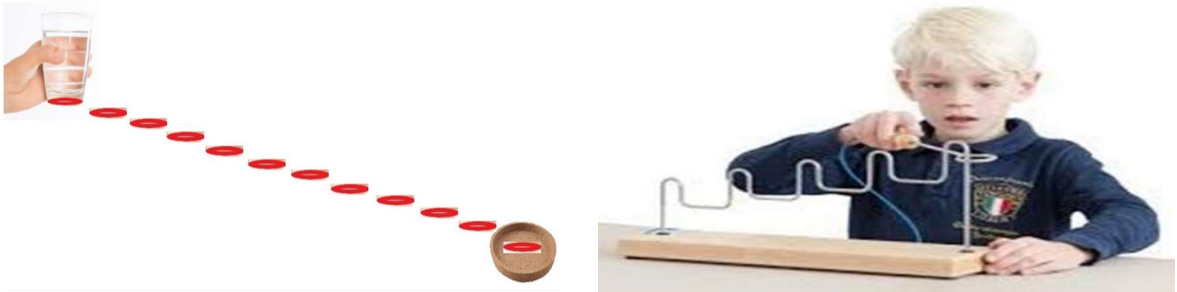
[5] Upon perusing the explanatory model, one will start to realize that the construction of a perceptual image of a latent action trajectory shape is necessary to initiate any motor action, but it doesn't need to be followed precisely. That's the essence of a highly economical system. In the initial stages of an action trajectory shape, it's not a problem at all if the letter deviates, as long as the letter comes closer to the endpoint. However, without a (precisely global) perceptual image of a latent action trajectory shape, motor actions cannot commence and the explanatory model introduces the term "*precise global*" in this context. The perceptual image of the latent action trajectory shape must precisely indicate the global (fluctuation boarders of the) direction it should take.

current position of the (bottom of the) glass and the coaster, starting with the first step of moving the (bottom of the) glass from position P(0) to position P(+1).



Images: The explanatory model of the motoric movement action provides a tangible example with the marble in the marble run, illustrating the continuous reciprocal perception-action coupling within any conceivable motoric action. From the perspective of the marble's current position, one can perceive the relationship within the entire marble run, and vice versa, one can perceive the relationship with the marble's current position from the perspective of the entire marble run. Although all this remains invisible when placing a glass on a coaster, it is present in an equivalent manner. Because in our worldly dimensions, it is just a mere fact that all positions P of any moving object, including the (bottom of the) glass, must emerge from each other, meaning that the perception of the (bottom of the) glass movement is always confined in one single line segment shape within a placing task. In which the current position P(0) of the (bottom of the) glass will always form the precise separation between the already manifest positions P(-x) and the still latent positions P(+x). In which could be further added that the perceptual image of the still latent action trajectory involves future projections that must arise from the observation of the movement of all subsequential manifest bottom positions prior to the current position P(0).

The perceptual image of the entire latent action trajectory shape thus also represents an image of its very beginning, and at the outset of the action, we will try to guide the (bottom of the) glass to follow that beginning. However, even during the bridging to this first position, due to the aforementioned mutual autonomous dependency of the internal and external focus, the (bottom of the) glass will inevitably deviate[6] from the perceptual image. It is an absolute factual given that cannot be avoided, and it would quickly lead to chaotic action trajectories[7] if there were not a system capable of mediating these deviations.



[6] As stated in the previous footnote, this precisely illustrates an optimal parsimonious model, where nothing needs to be executed very precisely, but only provides a general (albeit compelling) direction. If you had to identically place glasses at coasters, placing tasks would become a neigh impossible task. The task, where you only need to reduce the distance, offers countless more possibilities and demonstrates that the bridging process is just one aspect of the task at hand.

[7] The description of the cortical streams within the motoric movement action *car driving* is particularly notable in this regard. If deviations from the driving lane on a highway do not lead to corrections the exponential product will soon lead to accidents. Deviation upon deviation will cause an exponential grow due to the fact that they belong to two complex subsystems.

Images: The perceptual image of a latent action trajectory shape, constructed within the tactical movement action (TMA), depicts a smooth line segment shape from the (bottom of the) glass to the coaster. However, during the actual execution, the (bottom of the) glass, akin to a nerve spiral[8], will definitely deviate at every position P within that perceptual image due to the autonomy of the internal and external focus. This necessitates redirecting the (bottom of the) glass back to the original perceptual image to prevent a stacking of deviations. In practice, this means that a corresponding adjustment in the remaining part of the latent action trajectory shape must be made from the micro-deviation[9]. Similar to a marble in a marble run, the (bottom of the) glass in relationship to the whole action trajectory shape will become a part of a continuous mutual perception-action coupling, in which the dorsal stream primarily monitors the actual position of the (bottom of the) glass towards the action trajectory shape, and vice versa the ventral stream primarily monitors the action trajectory shape towards the actual position of the (bottom of the) glass. This ingenious mediation of the cortical streams creates the delusion of a straight action trajectory shape. Although the execution of a nerve spiral unequivocally shows the opposite.

Within there the explanatory model of the motoric movement action illustrates that the execution of action trajectory shapes indeed encompasses the essence of motor tasks, and that success hinges on the meticulous management of deviations of the action object within the action trajectory[10]. Therefore, it ideally presupposes a mutually reinforcing system that continuously monitors the relationship with the action trajectory shape from the current position of the (bottom of the) glass, and conversely, constantly monitors the actual position of the (bottom of the) glass from the perceptual image of the action trajectory.
The explanatory model thus implies a rather heavy correction system, and based upon current scientific literature, it concludes that the conceptual steps within the explanatory model precisely presuppose what is described neuroscientifically regarding the processing of perceptions: namely, the functionality of the dorsal and ventral streams. At every time *t* or at every position P, all observations are processed by the ventral and dorsal streams in such a way that deviations simply cannot escape attention. The ventral stream primarily processes deviations from the perceptual image of the entire action trajectory to the actual position of the (bottom of the) glass, while the dorsal stream does so vice versa, primarily from the actual position of the (bottom of the) glass to the perceptual image of the entire action trajectory. The mediation of these two processing streams leads to continuous micro-adjustments of the original perceptual image of the latent action trajectory shape, happening so ingeniously and

[8] https://www.researchgate.net/publication/376888581_The_nerve_spiral_demonstrates_that_random_motor_activity_implicitly_generates_an_internal_and_external_focus_and_provides_scientific_evidence_that_the_external_focus_can_guide_the_action_due_to_the_in
[9] You can speak of micro-adjustments or of updating c.q. renewing the perceptual image of the remaining latent action trajectory.
[10] One must be able to push an opponent away at the right moment in a precise *tau*-coupling process, not a moment earlier or later, must bring food precisely to the mouth, the fingertips must stop exactly at the coffee cup and not keep knocking it over, and the glass must also be precisely braked before the coaster and not only when it hits the coaster, which would cause valuable drink to be spilled or the glass to be broken.

swiftly that the absolute zigzag and accordion-like deviations barely stand out, making the executed action trajectory shapes appear deceptively straight.

4. The cortical streams mediate two autonomous groups of deviations within every conceivable action

The preceding paragraphs extensively delve into the fact that the action object will inevitably deviate from the perceptual image of the latent action trajectory shape, determined within the tactical movement action, when the action is actually performed. The occurring deviations of an action trajectory involve two autonomous phenomena[11], which relate to the words *line* and *shape* in the compound term *line segment shape*. The explanatory model demonstrates that they are observed and processed completely separately, yet simultaneously. Driving and cycling (without hand brakes) show, beyond any reasonable doubt, that the deviations in relationship to the line and shape are autonomously observed and processed.

Images: The deviations within each action trajectory shape involve two autonomous phenomena, as indicated by the explanatory model, referred to as the zigzag process and the accordion process. In driving and cycling (without hand brakes), it becomes immediately apparent that steering exclusively influences the *movement within the shape* (!) of the action trajectory. This defines the explanatory model as mediating deviations along the x-axis and causing the zigzag process. Additionally, it becomes equally evident that using the pedals exclusively influences the movement *within the line* (!) of the action trajectory. This defines the explanatory model as mediating deviations along the y-axis and causing the accordion process. Therefore, in driving, it becomes crystal clear that (processing the) perceptions in relationship to the shape have absolutely nothing to do with (processing the) perceptions in relationship to the line. In which it is essential to note that processing observations regarding filling the latent line with the manifest positions P within the external (primary) focus solely involves the perception of the *tau*-value and is thus actually generated solely by the pedals of the car or bicycle. Only the speed within which the line is filled determines the duration of the action, thus finalizing the action.

Deviations along the length axis or y-axis of the action trajectory shape involve deviations of the movement of the action object over time. They are related to determining the *tau*-value within a motor action, and deviations of the action object along the line can be characterized as an accordion process. Deviations along the width axis or x-axis of the shape of the action trajectory involve deviations of the movement of the action object within the shape and can be characterized as a zigzag process.

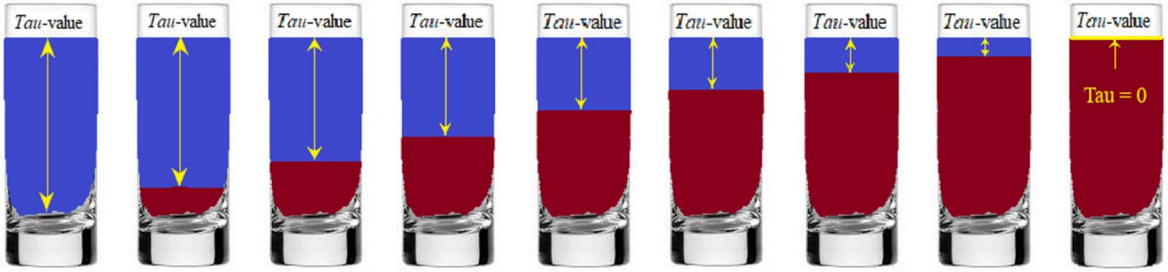
[11] In essence, they form two complex subsystems within the larger phenomenon of the whole cortical stream operation, revealing that perceiving deviations c.q. the processing of deviations leads to an unprecedented variety of hybrid perception processes. This article does not delve further into this complexity.

5. The zigzag process and the accordion process when placing a glass on a coaster

The explanatory model of the motoric movement action demonstrates that both the zigzag process and the accordion process occur within any conceivable action[12]. However, it's much harder to demonstrate this within placing a glass on a coaster as compared to, for instance, driving a car. Yet, even when placing a glass on a coaster, one must consider separate pedals and a steering wheel that autonomously influence the filling and mediating of the latent action trajectory shape between the (bottom of the) glass and the coaster, which will now be processed through hybrid forms of these phenomena. The zigzag process (the steering process) is easy to capture in an animation, but not the accordion process.

Images: The zigzag process in any conceivable action can easily be represented in an animation. Due to the fact that the primary focus can only be executed by the autonomous secondary focus, the action object (respectively, the (bottom of the) glass, the pointer, and the spoon bowl) will definitely deviate from the perceptual image of the latent action trajectory shape in width.

The accordion process (the pedal process) when placing a glass on a coaster is difficult to represent in an animation because it involves compressions and elongations of time[13]. Yet, just like within car driving, you must realize that you can never move the (bottom of the) glass identically in time along an action trajectory shape. You are quickly capable to empirically establish that the (bottom of the) glass will infinitely vary within certain fluctuation boarders.



Images: In the motoric movement action *pouring*, the accordion process is still difficult to capture in an animation. However, it can be factually stated that when filling a glass, as a very rare exception, there are absolutely no deviations within a zigzag process. The cortical streams are fully dedicated to the accordion process during pouring.

[12] While this imposes greater demands on organismal development, conversely, it allows for a compelling demonstration of its seamless integration within an ecological framework. The dichotomy that distinguishes a separate x- and y-axis component actually constitutes the breakthrough that allows us to reduce highly complex perception processes to such seemingly simple phenomena.
[13] Wherein it should be noted for the record that the (bottom of the) glass doesn't move back within the action trajectory shape.