The perception-action coupling theory

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The Functioning Of The Dorsal And Ventral Stream Within The Marble-Marble Run Relationship

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

N.J. Mol

The explanatory model of the motoric movement action hosts one universal clarification within all imaginable actions in which with the help of movements *from within the body* a movement of an (movement) action object within an action trajectory shape *on the outside of the body* must be executed. In which already two perspectives within one motoric action can be acknowledged.
Just seldomly those action trajectory shapes become visible. Conversely within the motoric movement actions *writing* and *nerve spiral* a visible action trajectory shape can be perceived and although the marble within the marble run only shows it's actual positions P, ergo doesn't become visible at any other place, an actual shape is present which shows the contours within which the movement of the marble will definitely occur. Due to these contours the marble run is able to show very plastically that within the perception-action coupling one overarching phenomenon will arise c.q. will have to occur in which our perception processes observe the actual position of the marble solely in a compelling relationship with the perceptual image of the whole latent action trajectory shape. Within this phenomenon the actual position of the marble at every place P marks the exact division between the manifest and latent part within the perceptual image of that line segment shape and due to this one is inter alia able to perceive at the most basal level, as one-dimensional as possible, that a manifest line is filling c.q. is closing a latent line. In which the explanatory model shows that any cognitive recognition of any part of the shape of that line can be ignored completely and clarifies that one is able to very simply perceive the *tau*-value becoming zero, as one-dimensional as possible, by just observing the linear closing of the aforementioned gap. Which also presents a very solid ecological argument because it can be linked to the earliest organisms.
Hence the explanatory model shows that two foci are demanded within every motoric movement action which already could be concluded out of the aforementioned opening sentence. The novum in here encompasses the fact that one focus always must be pointed to the (movement) action object i.c. the marble but in which it is even more important to notice that this part solely can and must be perceived out of the perspective of the marble and that the other part solely can and must be perceived out of the perspective of the body (towards the marble). Which within the movement sciences logically should have led to the conclusion that one action always encompasses two foci because the two perspectives, which belong to two irreconcilable worlds, can never be combined. In which the shocking character of this revelation is based within the fact that science was never capable to acknowledge that the successful execution of one motoric movement action demands the execution of two separate autonomous parts out of two completely different perspectives.

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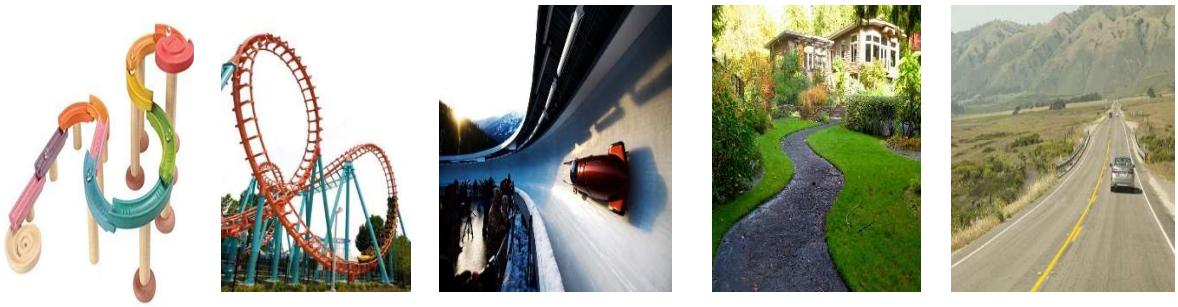
1. Introduction to the marble run

a. The explanatory model in relationship to the marble run

At a microlevel the clarification within this epistle has the sole goal to reveal all functional perception and motoric processes in relationship to the marble run. However at a macrolevel the main goal remains to communicate the complete explanatory model of all motoric movement actions. The explanatory model namely encompasses the complete and final description of all functional perception and motoric processes within all imaginable motoric actions. The problem however is situated in the fact that the final explanation of the explanatory model is situated at quite a remote distance from the current mindset within the movement sciences. Multiple significant mind steps are demanded which in a compelling way need to be regarded in their complex relations with each other before the final insight which the explanatory model provides us can be obtained. All readers at all levels will have to take this barrier and although the specialists within this field of science already possess much knowledge about certain single components it is expected that especially they will have great trouble to obtain the quintessence of the explanatory model because they persevere c.q. are taken hostage within some dogmas/premises which pertinent will appear to be false. This perseverance on the one hand and on the other hand the aforementioned demand for multiple mind steps within a complex dynamics system almost shapes an impossible barrier to overcome and needs to be bridged in a very structural and meticulous manner.



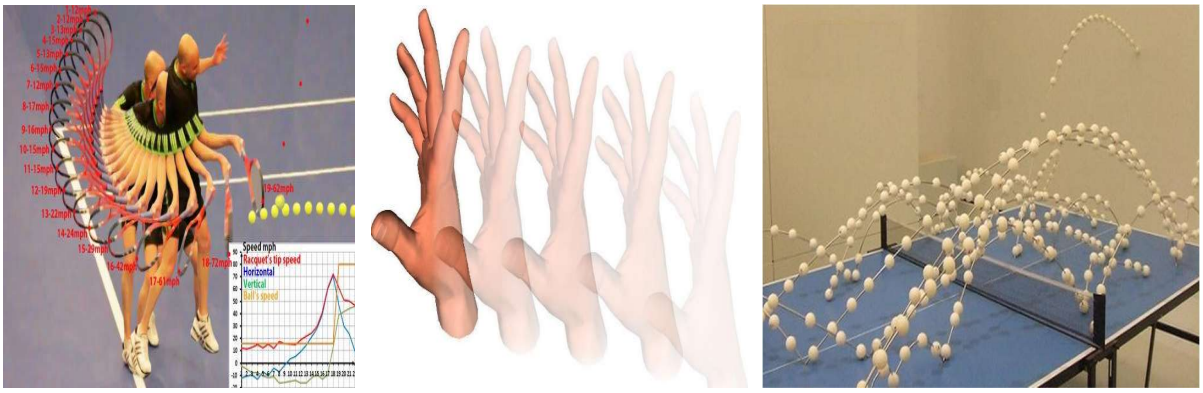
Images: A marble run seems to encompass a rather unique phenomenon. However within every imaginable motoric movement action a marble run is hidden. Daily you execute many actions in which one is able to more or less acknowledge a marble run.

One of the many complex mind twists encompasses the breakthrough within the perception-action coupling theory. Till now science became more and more aware that perception and action are linked but never were able to understand the exact origin of this relationship because they were never able to acknowledge the fact that we construct perceptual images of action trajectory shapes. The marble run plastically demonstrates how the marble-marble run relationship expresses the perception-action coupling within all imaginable motoric movement actions.

b. The motoric movement action *marble run* versus the marble run

Within this article the marble run is outlined and not the motoric movement action *marble run*. If one wants to execute the motoric movement action *marble run* one first needs to throw a marble in the entry position of the marble run which beholds such a simple action which besides that completely precedes the journey of the marble. Therefor it has been decided to leave this part out which also provides extra attention towards the autonomous process of the movement of the marble. Now it will become crystal clear that this part solely encompasses the marble in which only the marble will complete the essence of the task within the egocentric formulated will, that ergo all perception processes within this

part of the action must be observed out of the perspective of the marble and that it beholds a complete autonomous process within a complete autonomous complex subsystem.
If the motoric movement action *marble run* was appointed in here one would also be restrained by the fact that this action shows an obvious throwing action and although this is also the exact goal because the marble run stands model for all throwing actions it much more than that wants to emphasize that it also stands model for all catch actions because with sec the marble run one is able to envision every incoming object trajectory which we at a predetermined position deliberately want to catch or deliberately want to (not-)catch c.q. avoid (fleeing)[1]. This will be clarified within this article within for example the commonalities between the marble run and an incoming tennis ball trajectory shape.



Images: Within most actions the filling of a latent action trajectory shape by a manifest line segment shape doesn't become visible at all. Then the only thing which can be perceived visually is the actual position of the (movement) action object. Still all consecutive places P of the sweetspot of a tennis racket always become part of an action trajectory shape within the motoric movement action *hitting/touching etc.*, all consecutive places P of the relevant fingertips always become part of an action trajectory shape within the motoric movement action *grasping* and all consecutive places P of a ping pong ball always become part of an action trajectory shape within the motoric movement action *catching*. Hence always a marble-marble run (line segment shape) relationship will become manifest in which the perception-action coupling will take place.

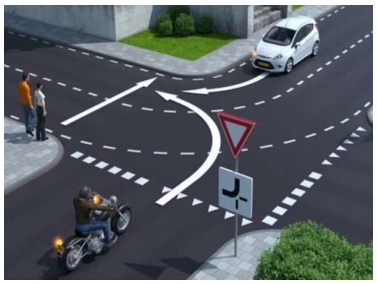
c. <u>The marble run represents the movement action (MA) within every imaginable motoric movement action</u>

It is likely that you are aware of the existence of marble runs and are familiar with how they operate. However it is also very likely that in relationship to the marble run you will remark that it encompasses a rather exclusive and specific phenomenon which therefor isn't capable to lead to general scientific conclusions. With this article the explanatory model will demonstrate the opposite and will conclude that a marble-marble run relationship is present within every imaginable motoric movement action.
Within the marble-marble run relationship the explanatory model shows that the single, the sole, components hardly have any meaning by themselves but that conversely the two together within an overarching phenomenon show how within every motoric action the perception needs to be linked to the action. With which 1. the explanatory model ends the whole perception-action dichotomy, 2. shows that one part of any action solely must be observed out of the perspective of the action object, 3. that solely this part executes the essence of the task formulated within the egocentric will, 4. that it definitely encompasses an optimization process and 5. that this part solely can be achieved due to the double c.q. mutual cooperation of the ventral and dorsal stream.

[1] See: The motoric movement action *catching/not-catching/avoiding/fleeing etc.*.

Images: Action trajectory shapes hardly ever become visible. Within the motoric movement action *writing* the tip of the pen represents the marble and the marble run is represented by the line segment shape of a whole letter, word or word part. Within the motoric movement action *flying*, an obvious example of the motoric movement action *moving A-B*, the pilot will hopefully always overlook how especially the latent part of the action trajectory shape will be constructed. By the way within any motoric movement action *moving A-B* it is characteristic that the movement of the marble within the marble run will be perceived from within the marble.

The explanatory model has already been assessed within many specific motoric movement actions which already have been published. In the exact same universal way you will be confronted with the marble-marble run coupling within all those explanations and that is why it will not be discussed in here any further. However due to the fact that the motoric movement action *traffic* isn't appointed thoroughly yet and due to the fact that a single driving lane shows such a striking similarity with a marble run it is shortly addressed within this article. Within daily road traffic we are confronted with the sole two main kinds of motoric movement actions. I.c. the motoric movement action *catching* and the motoric movement action *throwing*. The throwing of ourselves within our own action trajectory shape and the catching (read: *not*-catching (!)) of the other traffic participants within their own autonomous action trajectory shapes containing their own perception-action coupling perception processes.



The motoric movement action *traffic*

We don't really execute actual catch actions a lot. However the motoric movement action *not-catching* we conversely do experience and execute countless times within for example daily road traffic[2]. Within there you will have to determine all, *relevant* (?!)[3], action trajectory shapes of all traffic participants and within there all linked *tau*-values. In no other way you will be able to plan the void of your own latent action trajectory shape as opposed to the voids within the action trajectory shapes of the other traffic participants. Ergo you create a perceptual image of the latent action trajectory

[2] As a bycatch I want to remark in here that if you are willing to study the motoric movement action *catching* and especially the overlap within the not-catching you are able to conclude that very hopeful entries/solutions become available towards the latent parts within the *Neuron Mirror Imaging* research.

[3] In the following parts of this discourse it will appear to be that you will have to include all traffic participants within the tactical movement action (MA) because only then it will become apparent which latent parts of which latent action trajectory shapes will become relevant for you.

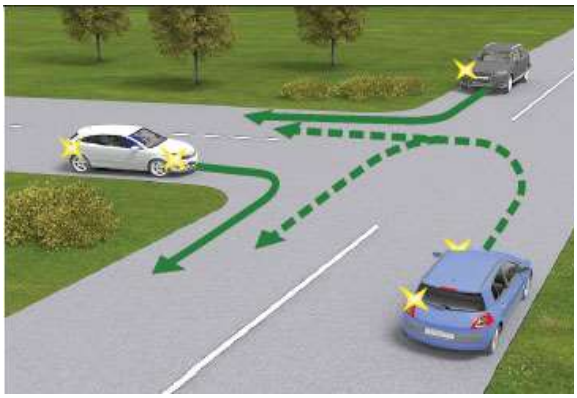
shape of every traffic participant and fill that with a perceptual image of the manifest part of it[4]. With your cognitive knowledge as the basis that will enable you to construct *tau*-values which provides you the possibility to construct intersection points between your and their action trajectory shapes and that within gross margins will allow you, in case you are a secure traffic participant and hardly take any risk, to cognitively determine if you will be able to create your own planned action trajectory shape in time[5].
If you want to cross a street as a pedestrian and you approach a cross road in which you have to give the right of way to the other traffic participants then you will handle the situation like this. If you notice a power wheelchair at a considerable distance of the crossing then you probably perceive at that moment that this participant is filling its latent action trajectory shape out of a perceptual image of the manifest shape in such a slow way that you will be able to very easily create the *tau*-value within your own action trajectory shape long before the wheelchair even will come close to the crossing. For the sake of correctness I have to remark in here that you don't determine any time frame in this situation but you perceive that the *tau*-value within the action trajectory of the wheelchair is approaching zero in such a slow tempo that you know for sure, based on your cognitive knowledge, that you are able to let your own *tau*-value approach zero much faster. Of course that is different when a Ferrari is involved. Although it is located at the exact same remote distance as the power wheelchair was positioned you as the secure traffic participant will now not be able to establish with certainty how the Ferrari will shape its *tau*-value[6]. Just like with the wheelchair you shape a latent action trajectory shape out of the actual place of the Ferrari till the intersection point with your own latent action trajectory shape and you now also want to establish the relevant *tau*-values. Or in fact you now also perceive with which speed the *empty* (!) space within a latent line segment shape will be filled and you judge with a security margin if you will be able to fill the empty space of your own line segment shape before the Ferrari will complete its action trajectory shape. If you (cognitively) judge that both *tau*-values show a definite intersection point in the form of a collision point then you decide to let the Ferrari pass first.

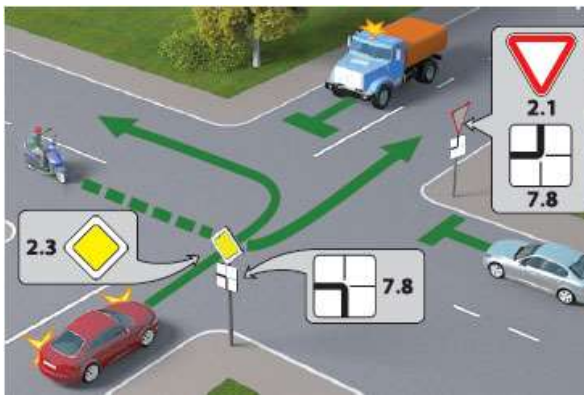
1. The *tau*-coupling within the motoric movement action *traffic*[7]

Within ordinary daily motoric actions at home we consider action trajectory shapes of moving objects/subjects like we assess action trajectories in daily road traffic[8] outdoors. Within there it is important to understand that the functional *tau*-coupling within the timing of a motoric movement action within traffic is based within a whole motoric action of one traffic participant itself[9]. Each

[4] Just like we logically aren't able to actually perceive the latent part of the action trajectory shape we also aren't able to actually see the manifest part of the action trajectory shape. Within there we will also have to rely on a perceptual image out of the actual place of the (movement) action object (MA) in relationship to previous places P (P(-1), P(-2), P(-3) etc.).
[5] Time is actually the very wrong word. We perceive this traffic situation in relative space.
[6] Besides the universal differences between a Ferrari and a powered wheelchair I also need to remark in here that we possess cognitive knowledge concerning the fluctuation boarders of lots of (movement) action objects (MA). The velocity of an action object is definitely a part of the action trajectory shape and so the much wider acceleration possibilities within the Ferrari cause that we have to reckon with much wider fluctuation boarders within the creation of the relevant *tau*-value.
[7] Excerpt from *Caught In A Line*; addendum 2; p.26.
[8] Remark the commonalities between the marble within the marble run (opening addendum 2 of *Caught In A Line*) and the car within its lane. Although the choice for an example like the marble run at first looks *weird* as well it is exactly this phenomenon which we experience in every motoric movement action and definitely within how we arranged to move from A to B.
[9] Within short notice I definitely will have to reappoint this more profoundly. Your own action trajectory shape relates to a *throwing*-action with an autonomous *tau*-coupling. The action trajectory shapes of the other traffic participants conversely need to be caught with the intention to actually not get them into your hands. Hence the *tau*-values of those participants must definitely be determined but they are not allowed to provide intersection points with our own *throwing*-action just like is the case within tennis for example. Traffic must be regarded much more as juggling a x-number of balls in a cascade. Within juggling one also needs to actively catch and specifically use the voids of the moving balls to launch the relevant ball in its ball trajectory shape once more.

vehicle in the accompanying images below is occupied with its own autonomous motoric movement action and within there with its own *tau*-coupling.
Each vehicle from bike to car is characterized by the fact that the action trajectory is created by its own (movement) action object (MA) which only can be influenced by a set intermediary constellation[10]. The transition point within for example driving a car out of the perspective of the legs is therefore situated between 1. the outside and the bottom of the sole of the shoe which will touch the relevant pedals and 2. the outside of the pedal that will be touched by the shoe.
The line segment over which, the transition point of, the specific pedal can be moved determines the *tau*-value of the motoric movement ($tau^{G}{}_{MM}$). Just like within most other motoric movement actions we don't have to perceive this *tau*-value with direct vision. Certainly within driving a car we perceive this in a proprioceptive way. Just like within most other motoric movement actions we do have to perceive the *tau*-value of our action trajectory ($tau^{G}{}_{MA}$) with direct vision. So if we suddenly have to queue behind another car the distance of the line segment shape between our car and the car in front of us determines, the gap or the latent action trajectory shape. When we observe the closing of this gap we are able to determine the leading *tau*-value of the movement action ($tau^{G}{}_{MA}$). The *tau*-value of the motoric movement ($tau^{G}{}_{MM}$) will have to follow the leading *tau*-value within the execution of one specific motoric movement action with one vehicle. Or with other words the brake pedal foot will need to put pressure in such a way to the pedal that it will correspond with the possibilities which the distance between the two cars provide ($tau^{G}{}_{MA} \approx tau^{G}{}_{MM}$).





Images: In daily road traffic we are continuously aware about the fact that other participants are *caught in a line*. Our perception processes in daily traffic especially observe the latent parts of the action trajectory shapes belonging to the present vehicles. This looking at *nothing* is an important function of the perception processes in all motoric movement actions because in there we visualize the latent action trajectory shape of our own motoric movement action *moving A-B*.

The other traffic participants produce their own action trajectories with their own *tau*-coupling like moving children in a kitchen. So they don't form a *tau*-value which has a direct consequence for the egocentric formulated task within your own motoric movement action. Fortunately we don't have to actually catch other participants in daily traffic but we only have to avoid them. That is why they will not become a part of the functional *tau*-coupling within the actual movement action. The *tau*-values of other participants only need to be judged marginally during the tactical movement action[11]. Therefore we only need to perceive the *tau*-value of the action trajectories of other road users

[10] In determining the transition point of a (motoric) movement object it is essential to know whether the object is flexible (f.e. spoon, tennis racket etc.) and adds an extra movement trajectory to the motoric movement (MM) or whether the object must be qualified as a set intermediary constellation (f.e. computer, car etc.) and that the object doesn't add an extra movement trajectory. See also *Caught In A Line*; Chapter 3-4 and 3-5.
[11] In actual catching the timing but also the shape within the movement action (MA) must be aligned with the timing and the shape within the motoric movement (MM). That is a far more complex task. See appendix B; The motoric movement action *catching/not-catching*.

(A, B. C etc.) and to take care of the fact that they don't collide with the timing of our own action trajectory ($tau^{G}{}_{MA\ (own)} \neq tau^{G}{}_{MA\ (A, B, C\ etc.)}$)[12].

2. The classic marble run [13]

"What is so fascinating about a marble run?[14] *You release the marble at the top and you know that a spherical object will roll down due to gravity. Is it because we let something move what can't move by itself? Is it because something is still moving while our effort stopped a long time ago? Or is it the fact that we impose our will to the marble to follow a defined path? Whatever the answer might be it will remain fascinating to stand in a mountain stream in summer and influence the water stream by just changing a few rocks. We are not able to control matter but we are able to control the direction of the matter. "*[15]

A classic marble run has one *whole* set shape (!) in which the starting and ending point represent just a minor part of the innumerable points P of that shape[16]. The whole marble run exactly determines which complete line segment shape the marble will have to follow. Within there it is important to notice that the shape also includes the involved time frame[17] and the involved length of the marble run. Equal marbles will pass the same route in an equal time. Each time frame one is able to make a statement about the actual place of the marble and the manifest and the latent part of the marble trajectory shape. Within the marble run an obvious mutual relationship can be noticed.

[12] You are able to distil in here that a conscious act to bump into another car, which is the task within for example the bumper cars at a fair, is a more complex task than to avoid a car in normal daily traffic.
[13] https://www.youtube.com/watch?v=_vg9J_4-kd8; https://www.youtube.com/watch?v=QQ9gs-5lRKc; https://www.youtube.com/watch?v=BfeHg0Zu1WQ;
[14] I still remember my childhood being intrigued by the rolling marbles. It was the same feeling I later felt with the tumbling of domino stones. The explanatory model creates a clear link between the motoric movement action *catching* and the motoric movement action *not-catching/fleeing/avoiding*. The movement actions (MA) of both actions are in fact identical. In that way the visual perception in motoric movement actions gains a more general context and does it provide a clear link to the recently developed insights within *neuron mirror imaging* research. That could probably lead to the conclusion that the aforementioned fascination within my childhood has a clear physiological origin.
[15] Cover text within the book *Caught In A Line*; http://watchtheballtrajectory.jouwweb.nl/downloads-1.
[16] Read: *Caught In A Line - The ball trajectory shape.*
[17] The time frame in which an action trajectory is created also belongs to the shape of the action trajectory. So the fluctuation borders of these time frames can also be predicted in a *precise global* way.

Image: A set marble run. Before you release the marble at the top you know exactly which shape the marble will have to follow[18]. Within a set marble run one can only visually perceive the actual place of the marble within a further invisible action trajectory[19]. Within almost all motoric actions the action trajectory shape remains invisible however within the motoric movement action *writing*, *pouring* and *nerve spiral* the whole action trajectory shape conversely becomes visible.

With the aforementioned revelation the perception-action dichotomy can be finalized at once because the explanatory model shows crystal clear that they both are obligatory needed in a compelling relationship within an overarching phenomenon and the latter shows that they hardly have any meaning without each other. The perception of the actual position of the marble at the front of the manifest action trajectory shape is obligatory to be able to actualise the perceptual image of the latent part, which the manifest part implicitly shapes, in an optimal way because also a marble will be able to deviate at any random point P (for example in time) within a marble run shape. This actualisation process then needs to be followed within the creation of the latent part of the action trajectory shape because at that moment it is *the best* (!) representation c.q. the best presumption how the future action trajectory shape will look like which the marble most likely is going to follow/fill. Just like it is formulated within the ball trajectory shape within tennis. The tennis ball is situated at the front of the ball trajectory shape but is also destined to follow the perceptual image of the latent part which implicitly arises from the manifest part. So in other words within every motoric movement action the (movement) action object is caught within a line which is unequivocally present within the marble run.

Image: Within every imaginable marble run the actual position of every imaginable marble, as the *front* (!) and leading part of the manifest action trajectory shape, needs to be perceived permanently to optimally update the perceptual image of the still latent part that implicitly arises out of the manifest shape.

So the marble will create the actual ball trajectory shape but it is also destined to follow the preset shape. If we want to make statements about the state of the marble run process than we need to compare the manifest line with the latent part of that line segment shape out of the perspective of the marble. The explanatory model will show that this state of the action trajectory, the closing of a line segment, also provides the leading *tau*-value ($tau^{Gap}{}_{MA}$) or ($tau^{G}{}_{MA}$) for the timing within the movement action (MA)[20]. The closing of this gap will lead the *dependent* motoric movement (MM) and by doing

[18] It is important that you start to see that you create the shape out of the perspective of the marble.
[19] So although the marble doesn't leave any actual footprints of manifest places P of the marble one will be able to visibly perceive the casing/enclosure of the shape very well.
[20] To better understand the autonomy of the movement action (MA) it is important to realize that we are able to interrupt the marble within the marble run at any place but that we are also able to decide to not interrupt it. For the movement action (MA) that makes no difference at all. Also study the motoric movement action *catching* versus the motoric movement action *not-catching*.

so it will lead the timing, the *tau*-value ($tau^{Gap}{}_{MM}$) or ($tau^{G}{}_{MM}$) , of the relevant movement trajectories. Together they determine the *functional tau*-coupling[21].
In comparison to most motoric movement actions one is not only able to assess a *precise* image of a *global* ball trajectory shape within a set, classic, marble run before the action starts but even a *precise* image[22] of a *precise* ball trajectory shape[23]. The fluctuation margins of possible deviations within the perceptual perception processes of future places of the marble will be very limited or nihil[24].

3. The marble run versus the action trajectory/marble run shape within a motoric movement action

Within every motoric movement action we first construct a perceptual image of a latent marble run over which the movement action (MA) will be executed[25]. This perceptual image encompasses a complete, a whole line segment shape (!) of a, (invisible) *marble run*. It is constructed out of the perspective of the relevant (movement) action object c.q. the marble and the ending point encompasses the location where the action object will finally complete the egocentric formulated will. The main difference with a real marble run comprises the fact that a perceptual image within most other motoric actions can only behold a *precise* image of a *global* marble run shape[26].
That has pros and cons. The major advantage is the fact that one is not bound to a set trajectory within the execution of an exact same motoric movement action. Within the exact same action one is allowed to perceptually shape any preferable marble run and adapt it at any given time. This forms a guarantee for maximal creativity and by doing so for 1. an undisturbed progression of the (movement) action object and 2. a successful fulfilment of the egocentric formulated goal and due to this one is able to anticipate maximally to unforeseen circumstances and suddenly occurring obstacles[27].

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[21] If at any moment you would decide to grab the rolling marble out of the marble run then you will also have to create a trajectory shape out of your fingertips to a set interception point of the two line segment shapes. With the movement of the fingertips along this trajectory shape towards that point you will also create a *tau*-value. If you want to intercept the marble just at the moment when the marble appears into the intersection point of these two line shapes then you will have to align both *tau*-values within a strict *tau*-coupling process.
[22] It is essential that you start to see that the shape of a classic marble run allows us to create a *precise* perceptual image of all future places P of the marble in a very early phase but that the *tau*-value can only be determined in a *precise global* way at that very early moment. Although the marble will hardly have any chance to deviate at any random point P when it comes to the *width* of the shape, it will be able to deviate in a *normal* way in *time* c.q. in the *length* of the shape.
[23] With the description of the motoric movement actions *bobsleighing/luging etc*., *car racing*, *free diving* the explanatory model will show however that also in very fixed/set marble runs, like for example a bobsleigh run, small deviations will occur. They become relevant in the aforementioned sports because there is hardly any time to correct these deviations due to the high speeds involved.
[24]Within the motoric movement action *cat and mouse game* a *very simple* marble run shape is used. But although it comprises a simple shape the action becomes extremely complex because the marble run is in fact a *non-transparent* tube. That is the crucial reason why this motoric movement action is so hard to execute and the explanation of that complexity shows/*proves* the need for a deliberate cooperation between a perceptual latent image and actual perception processes. To establish a *tau*-value one really needs to experience this relationship (!). It is the relationship that counts. So it appears that the independent phenomena do not possess a lot of (*tau*-) value themselves.
[25] Conform Gibson the explanatory model posits that the moment we enter a vista/environment an *abundance of* (action) *possibilities* are revealed. The explanatory model even surpasses that statement and says that within every motoric movement action one of those possibilities/*affordances* actually becomes manifest.
[26] Of course the difference with a physical present marble run is the fact that now you will not be able to perceive something that looks like a guide rail of the (movement) action object. Within most actions the marble run is invisible and so you need to construct a physical present marble run each time you are going to execute an action if you want to be convinced of the explanatory model. This marble run needs to be created within the void, *the nothing* (!), located *between* (!) the animal and the environment in which you will have to become aware that the *nothing* is an important part within every motoric movement action, that conform Gibson the *nothing* contains many invisible marble run trajectory shapes and that the *nothing* contains many advantages.
[27] See for example the assignments belonging to the motoric movement action *grabbing/taking/touching* within the clarification of the action trajectory shape (chapter 3.b).

Image: Within a return of a tennis service the incoming ball trajectory shape can be assessed as a marble run. The actual marble run shape also never becomes visible, also the marble must always be connected to the places P(+1) and P(-1) at any place P and the actual position of the marble outlines the exact division between the perceptual image of the manifest action trajectory and the latent action trajectory shape and that is what this image shows in all actual consecutive places of the tennis ball. However the main difference between almost all motoric actions and the marble run encompasses the fact that the marble run enforces lesser deviation possibilities within the action trajectory shape by constraining the marble within a strict guiding rail c.q. a straitjacket. Also the tennis ball is caught within a line and like aforementioned is certainly glued to the previous position P(-1) but the still latent places P(+x) are much more prone to deviations. Tennis is mainly an outdoor sport and the player who doesn't learn to cope with particularly the wind will never become successful. Besides that the net and the bounce of the tennis ball (f.e. gravel/lines) are a prominent source of huge deviations.

However due to the fact that the *marble*, in comparison to the classic marble run, will then be able to deviate and will deviate from the perceptual image at any place P there needs to be a (extra) control system that will monitor and implement possible deviations at any moment in time. That is the major disadvantage of such an open perceptual image. The explanatory model grants this assignment to the processing processes of the perception, the dorsal and ventral stream. The ventral stream will mainly have to observe the, manifest and latent part of the, marble run but in a set relationship to the actual place of the marble. The dorsal stream will mainly have to observe the actual place of the marble (and by doing so also provides the actual action moments) but in a set relationship to the whole marble run shape. The explanatory model shows that both streams are part of a continuous mutual relationship till the very end of a motoric movement action. If the marble deviates from its *action path* than at once another new *precise global* perceptual image of a latent part of the marble run must be constructed which the marble will then have to follow again[28].

[28] In general the marble run is presented as a *precise global* action trajectory shape. Although it must be understood that when the marble run progresses the perceptual image changes from *precise global* to *very precise*. With every point P less within the latent line segment shape the chance to deviations diminishes exponentially. If our hand really comes close to the apple or an espresso cup then the perceptual image of the still latent part of the action trajectory shape will hardly be able to deviate from the actual action trajectory. This exponentially *narrowing down* process is one of the essences of the parsimonious character of the explanatory model. The fact that the perceptual image of the last part of the latent action trajectory will hardly deviate from the actual action trajectory leads to the practical consequence that within a lot of motoric movement actions one can take away direct vision (but not the attention) in a phase before the action is completed. But that is only able to occur within these actions in which the fluctuation of the then still occurring deviations within the action trajectory shape can be covered widely within the fluctuation boundaries of the motoric movement (MM). For example the motoric movement actions *thread a needle*, *opening a front door lock with a key* or *(hold-)catching* are not able to fulfil

4. The not-transparent marble run within the motoric movement action *cat and mouse game*

Within the final part of this article the motoric movement action *cat and mouse game* is briefly addressed. It has already been appointed extensively in relationship to the explanatory model and is available at the internet at several locations.

Images: The motoric movement action *cat and mouse game* is known within two sizes. A small, room size, version (images left) and a big, game show and event size, version (images right).

This motoric movement action encompasses a very special marble run because the run is not-transparent and that exactly shows how by far the visual perception is superior within the accurate determination of the closing of the gap within the action trajectory shape. It shows that we crucially need an actual image of the position of the (movement) action object within the perceptual image of the whole marble run because only then we are capable of reducing that image to a simply to be perceived phenomenon. Then (within a catch action) we will perceive at a very basal, one-dimensional, level that a line segment will disappear c.q. will become zero like we for example also perceive when we observe the rising of the fluid level within a glass when we poor a liquid. We align this observation of the *tau*-value becoming zero with the basal, one-dimensional, disappearing of a line segment within the movement of the catch action from the cat. However within plain open marble runs this can be fulfilled but within a closed, not-transparent, marble run this simple phenomenon cannot be achieved and within there we will have to rely on c.q. regress to auditory perception processes to establish the actual position of the mouse within the perceptual image of its action trajectory shape and that is much more inferior.
The motoric movement action *cat and mouse game* also shows within for example tennis or cricket which are characterized by obligatory linked catch-throw actions how elite players adapted themselves to game situations in which a player doesn't get sufficient time to link the actual position of the incoming ball to a perceptual image of a whole marble run c.q. hardly is able to establish the *tau*-value, not even in a one-dimensional way, visually.

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that requirement (because within those actions the motoric movement (MM) needs to align to the movement action (MA) almost 1:1) and so within the end phase of these actions, when the perceptual image of the latent action trajectory shape will already be very precise, there still needs to be direct vision. For more information see for example the actual movement action within the motoric movement action *catching*.