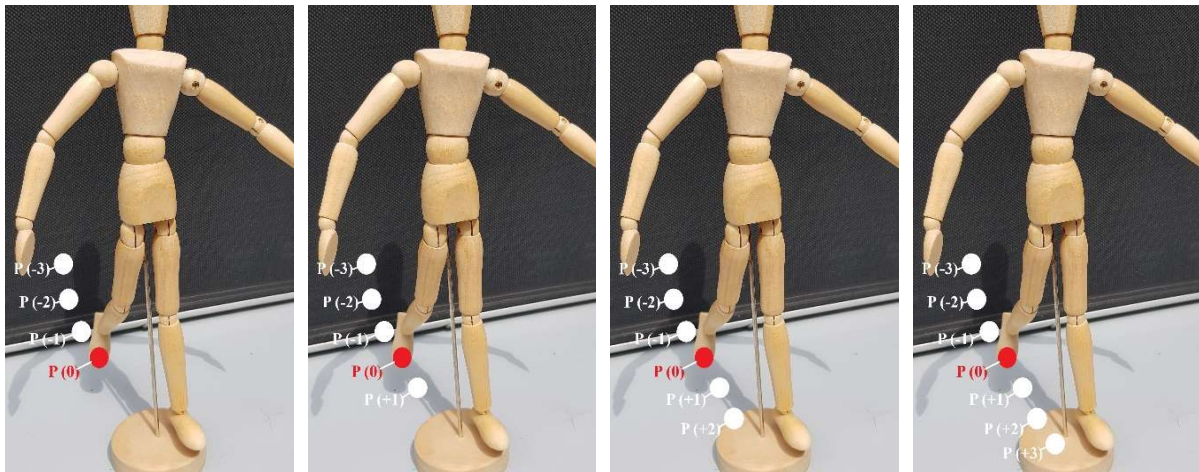
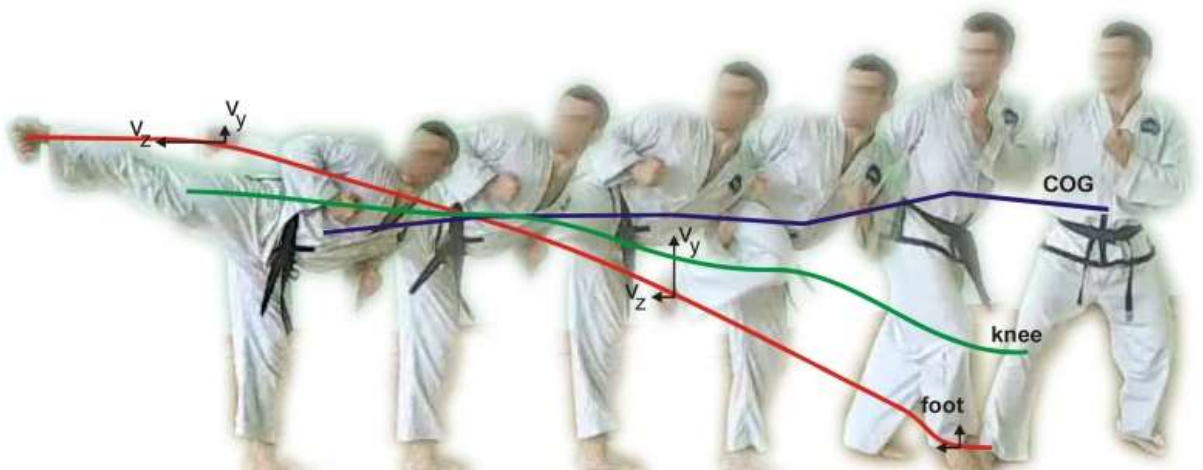


The final ecological clarification of our basal survival mechanism and all martial arts – The behavioural perception processes in relationship to an approaching foot



Caught In A Line

The explanatory model of all motoric movement actions

N.J. Mol
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Introduction

The explanatory model of all motoric movement actions encompasses the clarification of all motoric and perception processes at the functional c.q. the behavioural level. The model has been revealed medio 2016 but isn't understood yet. Due to the fact that the model comprises a complex system that is situated at a remote distance from current scientific mindsets. With a series of very short articles a new effort will be made to elucidate the most important principles of that complex system.

Within this article the complete explanation will be revealed of all factual perception processes in relationship to an approaching c.q. a moving foot. It encompasses every foot kick of a third person. So it can be a kick towards a ball but also a kick towards our body. The perception of moving body parts towards environmental objects is an essential part within lots of ball sports and within any combat sport you need to block or to dodge approaching hands, feet etc. etc. to all parts of your body. This article is mainly written with the explanation of the martial arts as the main objective. Due to which a overwhelming ecological argument is presented exposing an primeval essence of our survival mechanism.

Within science still many errors, misconceptions and omissions persevere to exist in relationship to interceptive actions. Besides this aspect the clarification of an approaching fist or foot will be held as an example for any imaginable motoric action because the explanatory model shows, with the strongest ecological argument¹, that any imaginable motoric action finds its origin within the perceiving of three foci which have the same universal objectives². The clarification of the perception processes in relationship to a hand or foot which approaches us³ solely encompasses the primary focus within each action which can be characterised as the catch action.

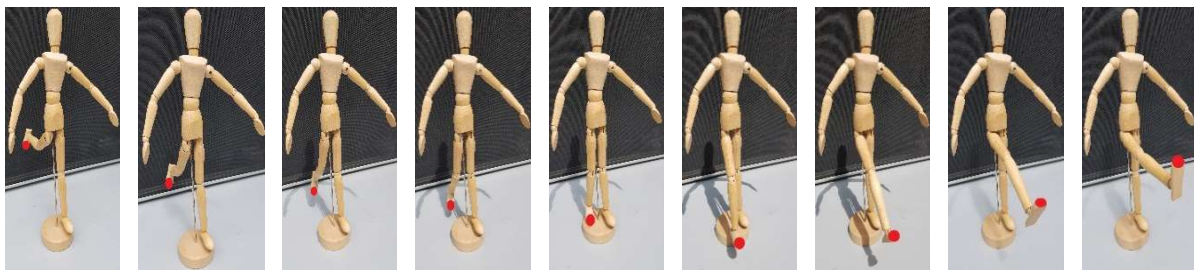


Image: We solely see the foot actually at position P(0).

¹ This article shows for example that we are capable to construct a very gross perceptual image of the end of an approaching action trajectory shape very early in the process and that we only have to adjust this image to more and more precise each subsequent timeframe. Which fits perfectly in the most ecological definition in regard to the term *parsimony* (!). We solely will have to actually (not)-catch (!) or (not)-hit (!) at the end of the incoming action trajectory shape when an approaching foot is involved. So in the beginning the perceptual image is allowed to be very vague as long as it compellingly provides *global* direction to future actions. So due to solely this aspect we are capable to act very quickly and do we only have to work c.q. have to perceive more precise at the end of an action.

² This ecological argument will be emphasized by in the same time publishing three essential motoric movement actions. Besides the approaching of a foot/hand the same principles are addressed within an incoming ball trajectory shape due to which all ball sports will be covered completely. Which will directly be followed by the explanation of the perception processes in relationship to an approaching car which unfolds exactly conform the aforementioned actions and which instantly reveals all perception processes in relationship to all traffic situations.

³ When we observe incoming ball trajectory shapes we most often do want to construct actual intersection points because we actually want to hit most incoming balls (exception: dodge ball). Within traffic we conversely do not want construct actual intersection points because we most often want to avoid the other traffic participants (exception: bumper cars). This article shows clearly the combination of the former two. Within martial arts you need to block or dodge almost an even number of incoming kicks or punches. Besides this interesting aspect it show that whether you block or dodge an approaching foot you perceive the incoming foot in the exact same way. It is most important to understand that the perception processes in relationship to the catching remain the same in all those examples. Solely the throwing of our own body will take care if we either catch or *not*-catch an incoming foot.

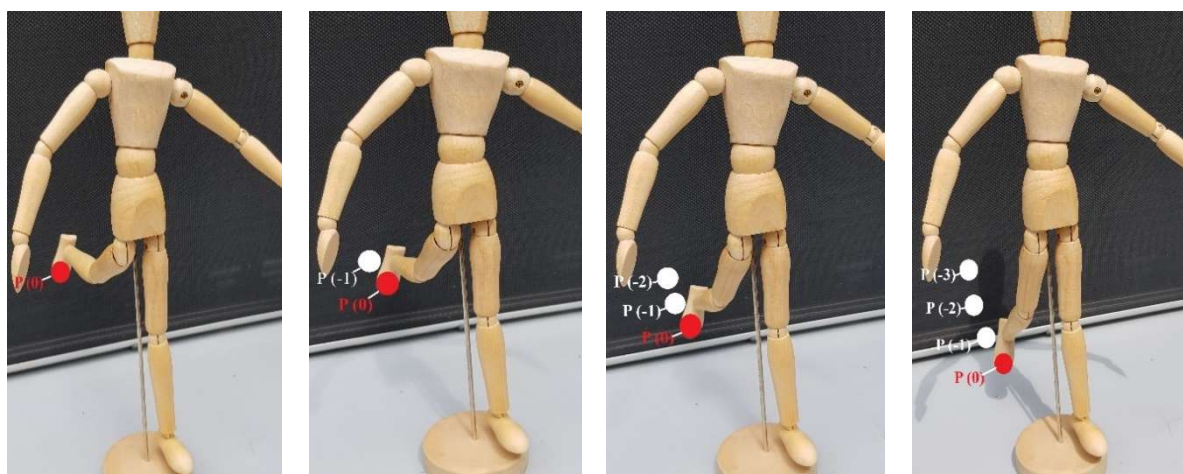
The approaching foot c.q. the incoming kick

This article encompasses the explanation of all the processes in relationship to the perception of a foot kick. It starts the explication from the first moment that the foot is moved forward after a maximal amplitude is reached within a preparation phase c.q. the explication begins when the foot starts to fill an action trajectory shape of a forward kick. The kick can be any kick. It can be aimed at an environmental object or it could compel an attack towards our body. It will factually show that the perception of the sole actual position of the foot will solely get its context in relationship to perceptual images of all manifest and future latent positions P of the foot.

With other words the unprecedented proof is provided that on the one hand a foot factually takes the first position P within a perceptual image of the manifest *foot* trajectory shape. This compels already a novum but an even far more revolutionary revelation encompasses on the other hand the fact that the foot also needs to follow or will follow the perceptual image of the action trajectory shape of the still latent positions sprouting from the manifest part because we are factually capable to construct a perceptual image of that latent part.

Facts and factual consequences

Within the dimensions of our world it is a fact that every manifest or future latent position P of whatever environmental object will sprout c.q. will arise out of each other⁴. So that will not be different when a foot, hand etc. etc. is involved and the beginning of an incoming kick can therefore be displayed as follows.



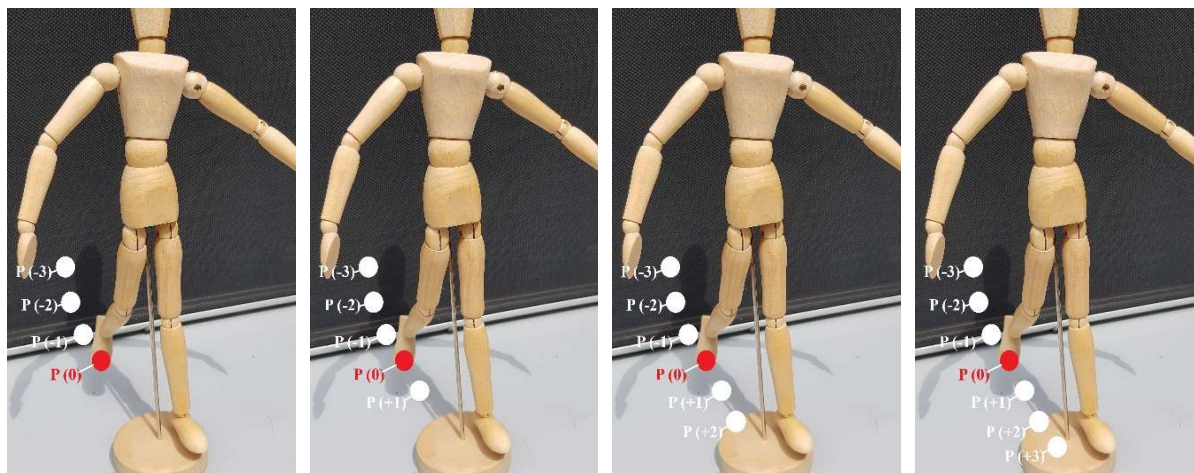
So factually we only see the foot at the actual position P(0) but conversely our perception processes did visually perceive the foot at the manifest positions P (-1, -2, -3, etc.) and accordingly a perceptual image has factually been constructed of a line segment shape. Due to a. that perceptual image of the manifest positions P of the foot and b. on basis of stored cognitive knowledge in relationship to ballistic behaviour (inertia, deceleration, acceleration etc.) of the *shape* (!) of the action trajectory we are factually capable to construct a perceptual image of the latent future positions P of the foot.

We are capable to execute this by fictitious lengthening the manifest line segment shape because, as explained earlier, factually all manifest but also all future positions of an environmental object are obligatory connected c.q. will have to arise out of each other. Hence we are even capable to make *precise* statements about the *global* progression when a foot, hand etc. is involved⁵.

⁴ In relationship to you as a whole human being this factual principle is maintained from the day you were born till the day you leave the world. Each and every step you make will always be connected.

⁵ Conversely when an inflated balloon is set loose without being tied up also all positions P of the balloon will of course be connected but we will never be capable to make *precise global* predictions of the end of balloon trajectory shape during the initial phase. Due to the fact that the fluctuation borders of possible deviations are too broad. <https://www.youtube.com/watch?v=pLfKxIIIzG4&t=121s>

However a foot can and will deviate randomly at any position $P(x)$ from the perceptual image of the future positions. The positions P will almost certain deviate in de width and in the length (*tau*-value) of the perceptual image of the future action trajectory shape. However the foot is factually solely capable to occupy very few limited future positions $P(+1)$ ⁶.



Images: We are capable to construct a perceptual image of a latent action trajectory shape by fictitious lengthening the manifest line segment shape because factually every manifest or future latent position P of whatever environmental object will have to sprout c.q. will have to arise out of each other. In which we can conclude that a *precise global* perceptual image can be constructed of the shape of all latent positions P when a kick of a foot is at hand. Due to the fact that we create a precise prediction of the future shape of an action trajectory in which the foot can and will deviate it allows us to start acting in a very early phase and are we gradually capable of working from global to more and more precise at the end of the action. In which the cortical streams mediate this process.

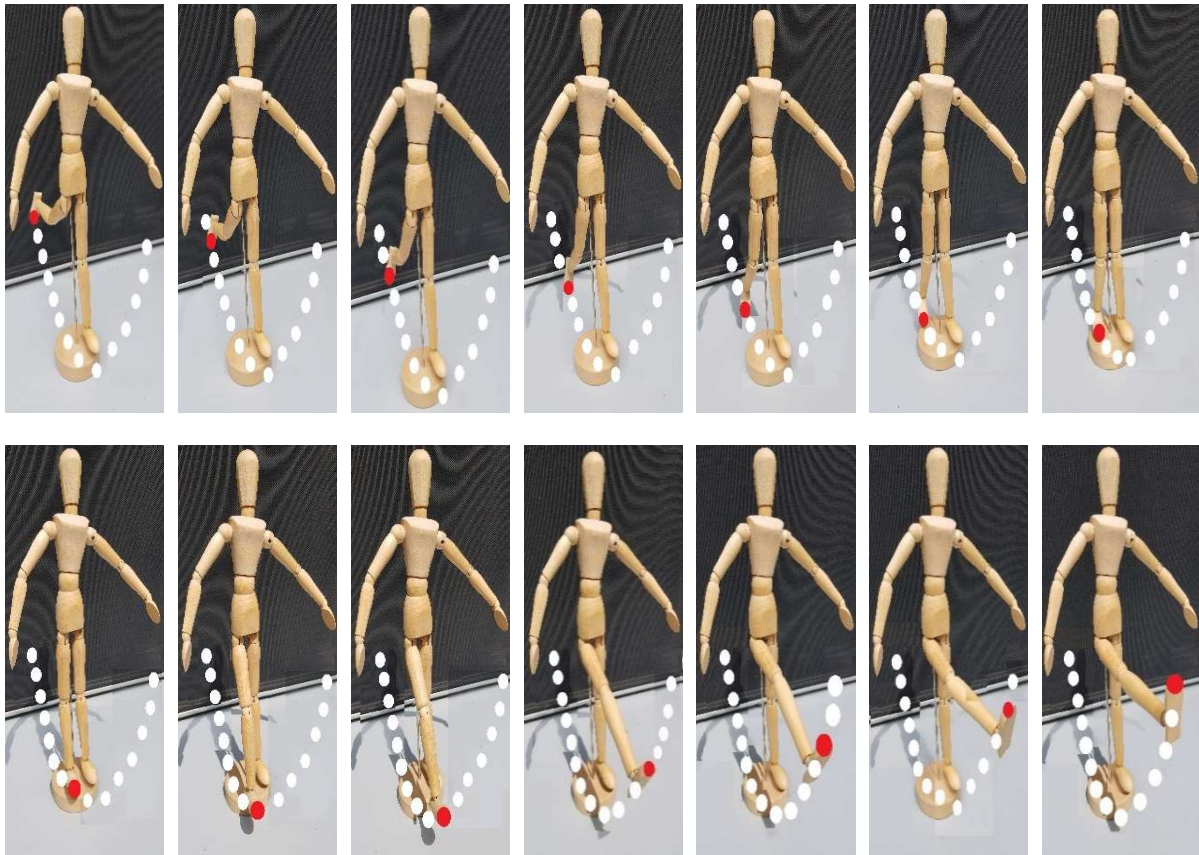
Due to solely this reason we are capable to even make very secure predictions about the whole progression of all latent positions of this incoming foot trajectory shape and that is based on the fact of cognitive knowledge concerning ballistic behaviour of the foot. However in spite of the inevitable fact that the foot will deviate from the perceptual image of the still latent positions P it is possible to construct a *precise global* perceptual image of the shape of all future latent positions P when a foot is involved⁷ as opposed to many other environmental objects. Within which it is important that you will have to start to see that the term *line segment shape* encompasses two autonomous entities. The exact line can factually never be revealed beforehand because it depends on *future* (!) movements of an autonomous environmental object. Conversely we are capable or we can just try to make a precise prediction of the (future) shape (of the line) within which the foot can and is going to deviate.

The perception-action coupling⁸

⁶ Besides the position $P(+1)$ also the positions $P^I(+1)$ and $P^{II}(+1)$ will be kept open within our visual perception and accordingly also the positions $P^I(+2)$, $P^{II}(+2)$, $P^{III}(+2)$ etc., positions $P^I(+3)$, $P^{II}(+3)$, $P^{III}(+3)$ etc., positions $P^I(+4)$, $P^{II}(+4)$, $P^{III}(+4)$ etc., etc. etc. will be able to arise.

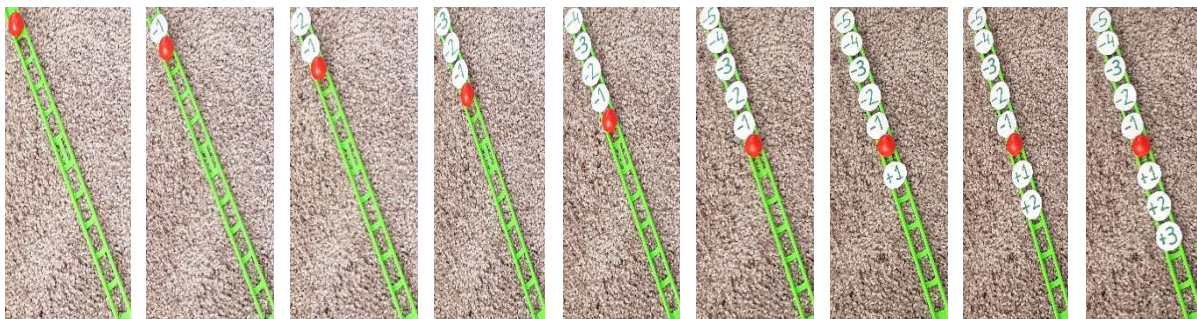
⁷ The exact future positions of a foot, car or a tennis ball can never be predicted beforehand but that is definitely not required. Our perception processes are capable of doing their job as long as the fluctuation borders of the occurring deviations will remain between certain values. Ergo as long as we are capable to construct a perceptual image of the shape of the action trajectory then we are capable to cope c.q. then we will be able to process the inevitable deviations which will maintain to happen till the end of the action. The processing processes are executed by the cortical streams. N.J. Mol (2020) - [\(PDF\) The cortical streams mediate the grasping of a coffee cup in the exact same way as they mediate the execution of the nerve spiral \(researchgate.net\)](#)

⁸ [\(PDF\) The perception-action coupling is an implicit fact sprouting from the way our perception processes observe each past and future actual \(!\) timeframe \(researchgate.net\)](#)



Images: The perception-action coupling is plastically shown within fourteen images.

The previous fourteen images also right away reveal the final explication in relationship to the perception-action dichotomy which still persists within science. You yourself are now capable to very plastically convince yourself that out of the manifest line segment shape a latent part arises *perpetually* (!) and that the actual position c.q. the perception of the actual position of the foot always marks the exact division. In that way the foot becomes a part of a set marble run⁹ of which the shape will remain similar in a *precise global* way and within which the actual position of the foot moves to the next adjacent latent position each ongoing time frame. Or to phrase it differently with each advancing position P of the foot an extra perceptual image of a manifest place will be added and leaving one latent position less. The perception-action coupling reveals within there crystal clear that a foot actually occupies the first position of the manifest action trajectory shape but also that the foot will have to follow or will follow the perceptual image of the still latent positions of the action trajectory shape.

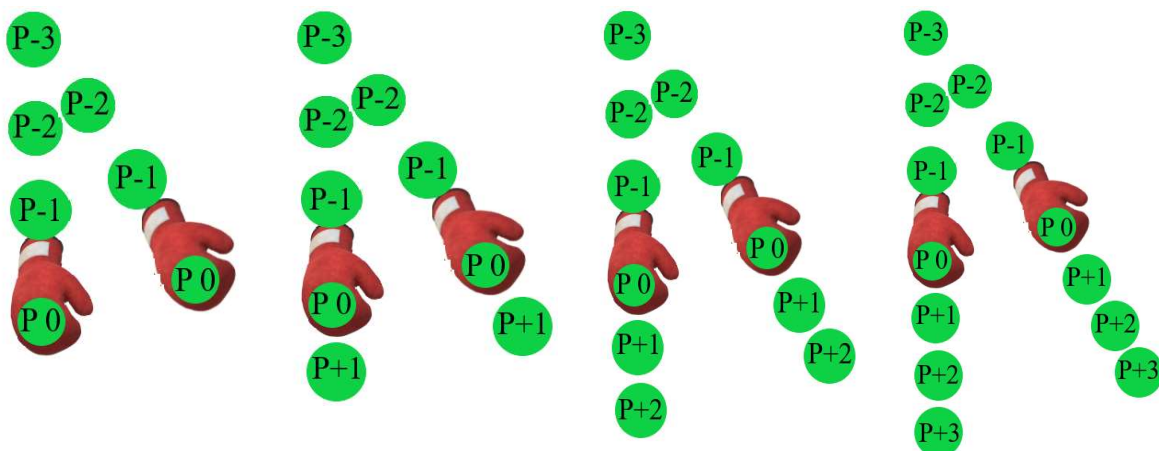


⁹ The marble-marble run relationship is assessed in many articles. F.e.: [\(PDF\) Not 1, not 2, but 3 attentional foci need to be simultaneously present within the execution of any successful motoric action – The behavioural c.q. functional perception processes within the grasping of a coffee cup. \(researchgate.net\)](#) and [\(PDF\) The perception-action coupling theory - The Functioning Of The Dorsal And Ventral Stream Within The Marble-Marble Run Relationship \(researchgate.net\)](#).

So beforehand we will never be capable to predict the exact line segment shape of the approaching foot. However if we were only capable to perceive a position of a foot if it actually occupies that space then we would never be able to plan future actions and would it neigh be impossible to (prematurely) anticipate to any incoming assault. That is obviously not the case. In spite of the fact that each approaching foot will definitely create a unique trajectory shape and therefor each time anew will have to be perceived factually within an optimization process we are capable to *preliminary* (!) distill very essential aspects from the shape of the incoming line segment shape. Additionally two of those very important factual features belonging to the shape will be further assessed. They are of crucial importance when we participate within combat sports.

The direction of the foot/fist

The direction of the action trajectory shape already becomes obvious just after a few initial positions P (the initial phase) of any environmental object. The direction is a crucial feature within the shape of the line and is unveiled when just a few positions P of a boxing glove become manifest.



The images of the gloves show clearly that a boxer is already capable to construct a *precise global* perceptual image in regard to the direction of the incoming action trajectory shape just after three manifest positions P of a glove c.q. in a very early phase and accordingly this provides the final explication which perception processes are involved within that task. Solely on ground of this information a boxer decides whether to block a punch on the left or on the right side because only then an actual intersection point between the line segment shape of the incoming glove and the line segment shape of the defending arm can be realised.

The τ -value c.q. the speed of the foot/fist

The speed or the τ -value becomes also apparent very soon after just a few initial positions P (the initial phase) of the foot or the boxing glove and if we add this fact to existing cognitive knowledge¹⁰ in relationship to relevant ballistic behaviour then we are also capable to make a *precise global* estimation of the moment when the foot or fist will arrive at the end of its action trajectory shape¹¹. If you perceive how fast a foot or hand fills the first part of an action trajectory you have developed a sound grip on how it will fill the remaining latent part. The perceiving of the foot or hand actually reaching the end of the incoming action trajectory shape is enormously important if we for example want to

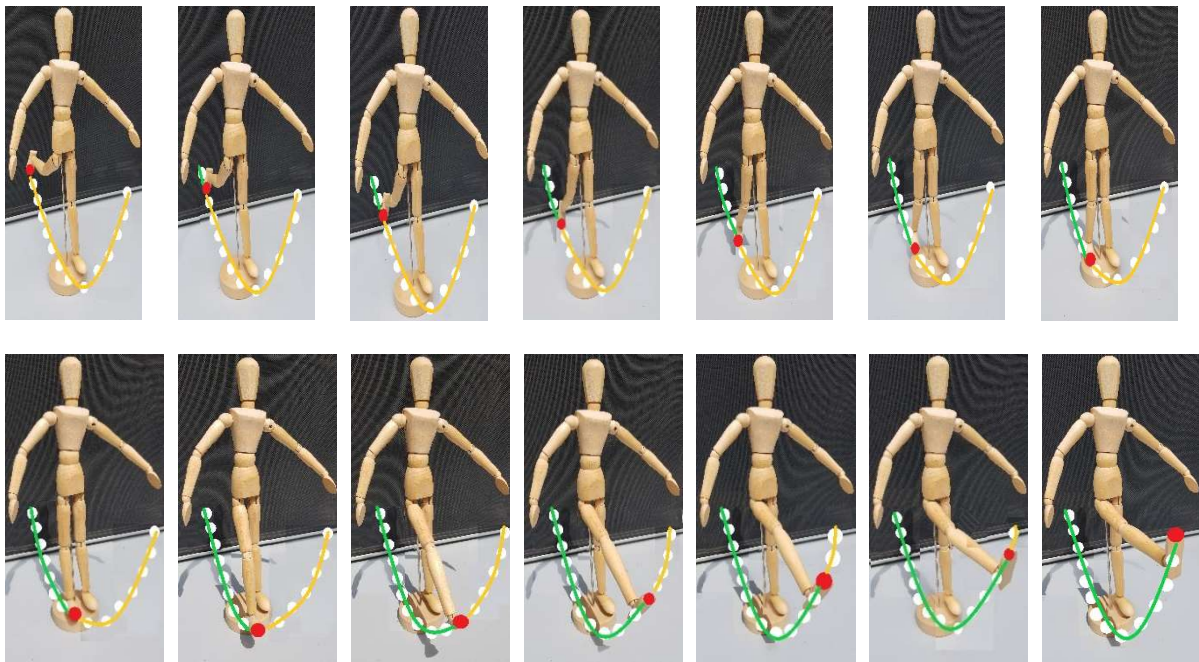
¹⁰ Besides universal cognitive knowledge fighters at a professional level also possess broad knowledge about their own qualities/possibilities (player-specific) and broad knowledge about the special features of their opponent's punches (opponent-specific).

¹¹ Within tennis Roger Federer for example possesses broad cognitive knowledge about the average speed with which a tennis ball fills an initial phase. With that cognitive knowledge he will approach the initial phase of the next incoming ball trajectory shape and will he be able to *precise global* estimate how he will have to approach the *end* (!) of this next incoming ball trajectory shape.

block or conversely want to dodge the approaching foot or hand. So in spite of the fact that a lot can be distilled from the initial phase we therefore need to perceive the progression of the car till the final end of the incoming action trajectory shape. The perception of the movement within the initial phase is only capable to provide huge guidance but will never be sufficient in itself.

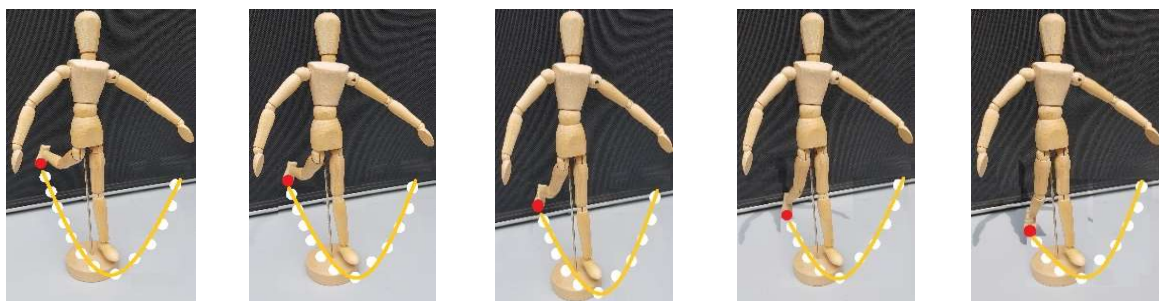
a. Strategy 1

We perceive the *tau*-value of an approaching foot in two distinct ways. The first type encompasses the perception of how the manifest foot trajectory shape fills the *whole* (!) action trajectory shape. The added images clearly show this phenomenon within which the green line fills the yellow trajectory. This mainly compels the perception of the manifest part and emphasizes the addition of an extra manifest position of the car each consecutive timeframe.



b. Strategy 2

Conversely the second type is occupied with the perception of the latent positions P. Within here we mainly perceive how the latent part of the foot trajectory shape *disappears* (!). Within the next images the yellow line disappears each added timeframe. D.N. Lee called this the disappearing of the *gap*¹² and it is very obvious that this gap and the according *tau*-value finally dissolves c.q. becomes zero.



¹² For an extensive assessment of the gap within the long jump see: [The tau-value within the long jump is the same as the tau-value within the grasping of a coffee cup - YouTube.](#)

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