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(Max van Kelegom has abandoned Verkeer-Zien on March 2nd 2018.)

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Sight! Limits of understanding and explaining the incomprehensible

Discussing why it is so difficult to explain the model tableau as a useful tool for approaching the visual experience of a complete environment

Ruurd Groot, IWACC & Verkeer-Zien, February 2018
with assistance by Mieke Groot & Jur Groot (IWACC)

Abstract
The *model tableau*, a name given to the full visual awareness of our actual surroundings, is conceptually useful for stressing the difference between its mental nature and the physical nature of an environment. At the same time, it highlights the difference between experiencing the whole and seeing (or looking at) something *in* it. This discussion introduces its origin, considers the problems encountered when trying to explain it and other concepts, and finally tries to show how it might be used to correct certain awkward perspectives.

thinking a tableau

In my dealings with visual matters, I use a concept named *model tableau*. Traditionally, visual research and theory were strongly—oh, well—focussed on central vision. Around 1980 my colleagues and I at IWACC became quite dissatisfied with this limitation, as it is rather evident that we actually have the awareness of a very wide visual environment before us. Much of this awareness is largely fed by information from the periphery of the retina which, when naively compared to central vision, seems a somewhat inferior source.

This offhand disqualification ignores the fact that we do not judge the qualities of an environment on just the centre, but on the *whole* tableau in front of us and around us. And by 'quality' I do not just mean aesthetic quality but the quality of an environment as the main guide for our spatial behaviour and other choices and judgements. When it comes to moving around, people with damaged central vision can still be quite competent, while damaged peripheral vision can lead to hopeless blundering about and tripping over tiny bumps, even in familiar surroundings.

When we started out from this premise, we needed a name for this 'global vision' idea. We could not talk of an 'image', as people often do, because what we see is not just a copy or projection of the physical environment, but some *creation* on the canvas of our mindbrain. It exists *nowhere else*. Surely it is something of a *model* of the world around us, so it seemed not too far out to call it the *model tableau*. This 'technical term' gradually developed into a *heuristic model*, a tool for understanding our seeing of the world and our acting upon it. Further down this discussion, starting with the section headed **down to business** on page 3, are a few pages where I'm more or less explaining the model tableau itself; you may prefer to try and read these pages first and then return here to continue...

what's the problem?

The concept of the *model tableau* is an important tool in my tentative mental representations of matters or *paradigms* for probing the visual process. When using the term 'model tableau' in a text or in front of an audience, I have to explain it. Although quite intuitive as concepts go, people are often so encumbered by their usual understanding of seeing, or 'the visual system', that they cannot seem to get a grip on this 'model tableau'. Their understanding is often fixed by a rather theoretical take on vision, a paradigm derived from various simplistic or contrived, psychological or mechanistic narratives, or other rather unreliable sources. Or they have a 'natural' idea about it as self-evident, needing no further thinking about—which is the worst paradigm of all.

I often get the impression that people strongly resist changing their attitude about vision—occasionally they may even get quite angry. What's going on with this problem of incomprehension and its corollary: 'inexplainability'?

books or balls

Anyone proficient or competent in a special way seems to have a miraculous ability. This goes for a juggler, a mathematician, a football star, a concert pianist etc. All have reached their level by diligent study, some with a lot of books and others with a lot of balls, but all with a lot of practice. It's customary to make a distinction between *physical* excellence, *artistic* excellence, and *cognitive* excellence; often we then assign a different intellectual value to each of these. I won't go into that, mainly because I don't give a hoot about such valuations. The cerebral and mental principles involved are largely similar.

(Actually, it's way more difficult to express how to juggle than it is to explain something like conservation of momentum. To me, the terms 'cognitive' and 'cognition' are rather iffy. Eggheads mustn't underestimate the intellectual and perceptual intricacies of 'mere manual' skills.)

limits of thinking with language

Even quite intelligent people are supposed to be unable to understand a subject like quantum mechanics (QM) or general relativity (GR). To my mind, it's just their preconceived ideas that are the obstacle. Such representations of matters are determined by the *scale* or *level* of their natural experiences, and limited by their language, as our language is an expression and guide of these experiences. When QM started, the experts too had a hard time understanding their subject. Somewhat later, even the great theoretical physicist Richard Feynman still meant, "I can safely say that nobody understands quantum mechanics." And Max Born, one of the pioneers of quantum theory, could only say, "Somewhere in our doctrine there lurks a conception not justified by any experience, which will have to be eliminated in order to clear the way." But I think it is the other way around. It's our personal paradigm that has to shift. And what's more: our perspective on *understanding itself* has to change(1).

Some people who have studied QM in the past have turned to mysticism, genuinely believing there was a transcendent mystery at the core of our existence that we aren't meant to solve. But that didn't stop others from trying. For a time the reigning slogan was: "Shut up and calculate!", but in time, later generations calmed down and became less and less prone to mysticism, by a process explained further on. They are hardly ever hampered by such tendencies any more.

to be *and* not to be

For now, I will concentrate on QM, as it is fundamentally even more problematic than GR. QM hinges on Schrödinger's equation; at its core there's nothing weird: it defines a 'wave function'—a continuous and causal process of change: one thing leading to another. But the actual *result* of it appears really weird. To describe what happens to the state of things, many use the expression that it suddenly 'collapses' or 'jumps', just like that. Actually, nothing 'collapses' or 'jumps', but the reality that the equation implies unavoidably admits of multiple *contradictory* states existing at the same time. As if something can be *so* AND *not so*...

On the other hand, we cannot deny that physical reality as a whole is based on this equation, while on *our* scale things cannot be so *and* not so—and we do not know how to explain that in simple words. On the quantum level, processes are non-local: things cannot be explicitly at one specific place *and* in one specific state. To make matters worse, processes are non-causal: the state of something cannot be explictitly determined by its past. Such a reality violates our normal intuitions—the non-locality alone seems already bad enough, as it entails a simple contradiction: a thing being here *and* there. In a weird way, non-causality seems to imply that the state of something may in part depend on a future situation. Our normal causality presumes that the state of things *now* is the cause of what happens next, the present follows from the past and the future follows from the present. But at the quantum level, all interacting 'particles' are entangled in a way, which means that their 'nowstate' cannot be *defined* in the normal way, so we cannot assume a comprehensible law of enforced causation.

jumping perspectives

Normal thinking and talking about this situation is a problem. On the other hand, our mathematical language has operators and other concepts that let us calculate almost anything we want. When we do so, however, we manipulate an abstract world we cannot see, hear or feel. In actual practice, physicists develop heuristic models for thinking about the intermediate stages of the calculation—but when different physicists meet to discuss the field, their heuristic models often turn out to be rather dissimilar. Common language can't consistently express QM reality, as that language is based on the logic of our common experience in *our* level of reality, where everything is in its place and nothing is non-local.

The limits of our common language prevent us from making QM understandable to most people: they hit a wall of mystery at the bottom of reality. And while they cannot really 'understand' themselves, they see experts blithely working with it. Very frustrating—how can that be? One part of the answer is that different physicists, using different heuristic models, can talk and work together by learning to appreciate each other's *perspective*.

always expect the unexpected

Experts learn to reason quite intuitively about quantum mechanics etc. through repeatedly using the mathematical operations involved and noting the results. This constant repetition leads to getting *familiarized* with the order of mathematical events and in a sense learning their behaviour: one starts getting premonitions, perceived patterns start entailing potential opportunities (affordances(2)) or obstacles, one develops a menagerie of heuristic models to arrive at more or less automated decision making. In fact, this is the dawning of what we call *understanding*. There's just one tiny problem: all this understanding does *not* automatically go hand in hand with an ability to explain quantum mechanics to somebody else.

Apparently, to understand something doesn't entail the ability to explain it at all. Understanding is about our being familiar with something, our ease of handling it. Understanding a field refers to more than just a subject: it also refers to our competence with meeting unusual variations in the field, to 'how prepared we are for the unexpected'; and to how competent we are in solving problems in the field. But why isn't that enough to be able to *explain* it?

listen carefully, I'll explain this only once

For the explainer, explanation has two sides: understanding and command of language. Complications arise when we realize that the persons for whom the explanation is intended also need a pre-existing minimum of comprehension and a certain minimal vocabulary; another necessity is openness, the willingness to change one's perspective. And certainly essential: apart from their level of understanding, *explainers* must have the creative ability to express their understanding in wordings that connect to the lingual experience of the audience. Explainer and audience must share something like a compatible paradigm, their view of things shouldn't conflict too much but must have sufficient overlap, a common ground. Thus, the ability to explain entails much more than the ability to understand. For that matter, we'll always gain a better understanding of our field as we gain more experience in explaining it.

Generally, people expect of someone understanding a subject a similar ability to explain it. So if someone claims to understand a subject, their inability to explain it leads to doubts about their comprehension. They may even mistakenly start doubting it themselves. From the preceding paragraphs it may be concluded that it doesn't work that way. The fact that someone *cannot explain* something doesn't mean that they *do not understand* it.

trust me, I'm a doctor

So people just have to trust the expert physicists, much like they must trust their doctors or car mechanics. We do so because we understand very well that *they* understand it, even if *we* do not. After all, we ourselves probably understand lots of things about our own specialties that many others have no notion about. Of course, there's always the possibility to start *familiarizing* ourselves with a subject...

Regretfully this isn't quite the end of it, for there are many pitfalls when explaining some aspect of a specialist subject. Heuristic models are very useful to the experts, but analogies are often expressed by words referring to 'normal' experience. The experts themselves know they're just analogies, 'figures of speech' as it were, and won't confuse the special properties of the subject world with the properties of the phenomena in the 'normal' world that the analogy refers to. But the lay audience may certainly do exactly that...

It's the power of analogies that makes explanations so clear to understand, but exactly this power is also a source of misunderstanding. The analogy evokes the image of a familiar phenomenon and uses a selected few of the properties of that phenomenon, while neglecting all other properties. This way, the audience is helped to imagine what it's about and henceforth will liken the 'habits' of the difficult subject with the 'habits' of the familiar. But where to stop? One may easily be tempted to extrapolate from the newly 'understood' analogy *beyond just the selected properties*. And then things may go horribly wrong—unwanted contradictions may arise, or the previous understanding may lead to mistakes with real consequences.

making waves

As a simple example I'll use a clear explanation by a real master explainer, Viktor T. Toth(3), somewhat of a polymath often appearing on the Quora website. In his answer to the question *"How can a photon travel in every direction simultaneously before it strikes something?"* (4) he explained:

> Photons are excitations of the electromagnetic field. [...] These "excitations" are what we call photons.
>
> So suppose something emits a photon. What actually happens is that an excitation is generated in the electromagnetic field. This excitation has certain properties, including energy and momentum. The equations that tell us how these excitations propagate in the field also tell us the likelihood of observing them at various places. In the end, when we observe a photon, it means that we are extracting an excitation from the field. [...]

This is a really good explanation when presented to someone with that pre-existing minimum of comprehension and the required minimum of vocabulary, plus the necessary willingness to change their perspective. But what if someone with more limited capabilities starts extrapolating from this exposition, based on the 'excitation' of a 'field'? They'll ignore most of the last sentence as too 'scientific' and tend to think of a phenomenon like a disturbance in a water surface, a wave of expanding circles. When this wave hits something somewhere, energy may be transferred, but the circles will continue expanding. How to imagine a local absorption or interaction that instantly extinguishes the whole wave all around?

muzzle your analogies and wave your hands

This shows that in general it will be better to add a very clear warning about the limits of an analogy. But there's more to be said. In principle all heuristic models are based on analogies, and as shown before, when a subject is newly introduced the practical way to go about it is using heuristic models. As these are mostly based on analogies, such a new subject is generally plagued by illicit extrapolations. For a subject with a tradition of rigorous mathematical modelling and/or strict testing of the nascent representation of matters, this isn't a big problem: in time things will be sorted out.

But when a subject is really new, and doesn't have such a tradition as yet —and that certainly holds for the *model tableau*— explaining and expanding it are a very risky business. Such an undertaking requires lots and lots of carefully chosen words, accompanied by vigorous hand waving, heaps of picturesque analogies with appropriate cautions about their limits, and last but not least: an audience with some common ground and without a frozen attitude against new perspectives.

down to business

As explained in the paragraph headed **thinking a tableau** at the start of this discussion, I use the *model tableau* for a heuristic model when thinking about our visual awareness of a full and coherent environment and how it comes about. This model tableau entails far more than what seems to be immediately available for precise and conscious description at a given moment. It is true that outside central vision, the visual world seems to become increasingly undefined, and it is as if only by shifting the gaze that things become more definite. Around 1986 Jan J. Koenderink(4) once commented on our notion of a model tableau that it is quite neat, as if we employ a low-definition map we can locally zoom in on to get more detailed maps. A problem with this analogy is that it might easily suggest that we are merely talking about a matter of spatial or pixel-like resolution, but there must be more to it. For how then does the mind-brain know beforehand to which hitherto *hidden* detail to shift the gaze?

A simple analogy can be used for clarifying the character of the model tableau, as opposed to the limited and confined result of central vision. Just think of the difference of being immersed in the acoustic complexity of a symphony, as opposed to listening to a single instrument from that orchestra. Just as the sound experience from the whole orchestra is not simply the sum of the sounds from the individual instruments, the model tableau is not just the perceptual sum of the elements in an outside scene.

there but not there

In normal circumstances and at moderate speeds, our eye movements generally only need to sample the environment by a limited number of specific targets from our surroundings. This suggests that shifting the gaze must be based on something like a latent awareness of what is only available from the periphery. This 'latent' awareness we should also deem part of the model tableau as far as it has a visual quality. Furthermore, when closing our eyes the model tableau persists to some degree and after turning around, what is behind us also lingers in the tableau—at least for a while. This visually available but not necessarily conscious part of the model tableau seems indispensable for moving around without having to check every detail of our vicinity with the central gaze.

something like, uh...

The more or less latent part of the model tableau is a bit like when we try to imagine the remembered visual experience of an environment in the past or elsewhere, but it functions in quite a different way. Such a remembered, imagined tableau can be easily manipulated in bizarre ways and is difficult to summon and maintain. The latent model tableau of the present exists without any exertion and becomes fully available by simply moving our gaze or our head.

Nowadays, what is perceived from the wide visual environment is sometimes designated by the word 'gist'[6]. This suggests the reduced qualities of a summary or an abstract, and compression by means of skipping details. But I would propose that the model tableau appears to be a great source of all kinds of *meaning*, and meanings are not a product of simple compression. It is more as if the model tableau, particularly the latent model tableau, does not consist of explicitly encoded items, but is sort of a provider of more or less specific semantic 'points of action', of relative positional information, of affordances or potential obstacles etc. As a subjective phenomenon it may be related to something like a momentarily available distribution or *ensemble* of potentially activated connectivities in the mindbrain.

on the road

Vision is of prime importance when travelling at speed in a complex environment. Actually, it was around the time when we at IWACC were asked to tackle problems in that area that we started developing the notion of the model tableau. From the model tableau we derived a few subsidiary concepts of practical use. As an example, I mention here the connected pair *scene coherence* and *scene dependence*, both referring to important effects on behaviour and understanding when we set up an artificial environment, such as for road traffic. In both cases, the word 'scene' refers to the external, physical source of our model tableau.The first, scene coherence, is a.o. about the necessity to prevent the emergence of a chaotically-fragmented model tableau, which may e.g. result from introducing injudicious conspicuousness[7]. The second refers to the dependence of the effect of an intervention in the scene on the character of the original model tableau.

The example of road traffic illustrates the use of the model tableau and its subsidiary concepts. To make road traffic safer, road markings (white lines) are utilized to facilitate following the road or lane. This function demands sufficient contrast and continuity. The contrast makes them conspicuous and added to their continuity this type of road markings results in what is known as a 'supernormal stimulus'[8]. The effect is that drivers on this type of road are exposed to an unconscious invitation, i.e. the potential opportunity (affordance) for excessive speeding. While driving along, anything outwith —pardon my Scots— the stretch of road in front of the driver is now submerged in a subordinate part of the model tableau, including pedestrians, intersecting bicycle paths, other crossing traffic etc.

On motorways, or freeways, this effect might be tolerated; on regional and rural roads it is very much out of place. By experimenting with larger shapes and lower contrasts[9], to try and preserve the coherence, we might find a better solution. Such experiments are greatly needed, but their realisation is stifled by the prevailing paradigm of uniform line marking.

please, no pictures

From the above it follows that having subjects view a *picture of a scene*, which is often employed as a simple surrogate in visual researches, cannot give the same visual and behavioural results as when these subjects are looking at *and* behaving in a real environment. Viewing a picture doesn't result in a full blown model tableau and all that entails. The picture will be just a *part* of the present tableau, a part that can evoke some of the effects of being in an environment—a *virtual* environment. The properties of such a virtual environment are the object of researches in what is called *pictorial space*. Though some of the results may be deceptively similar, the neural and mental processes involved can't be equivalent at all.

Apart from this fundamental difference, viewing flat images has many other shortcomings. The flatness excludes any effect of eye accommodation and real depth. The images used are generally of very limited size, so the retinal projection covers only a near-central part of the retina and the spatial distribution of parts of the image does not correspond with the distribution of parts of the outside scene over the retinal periphery and its functional zones. Images are often 'taken' from an inappropriate point of view and shown or reproduced with an unnaturally narrow viewing angle —which exacerbates the problem of peripheral distribution— to say nothing of the colours and contrasts etc., which often do not meet minimal requirements of faithfulness.

nor movies

Viewing images in a film-based simulator introduces motion, but it has many of the same flaws, and the movement of the images does not correspond with a true subjective inertial experience of acceleration, including turning. Subjects may get quite dizzy or have trouble with normal seeing after prolonged looking at a simulation, proving the added complications and limits of such projections. One might think that so-called 3D film would solve these problems, but that is not the case: such 3D films are anything but 3D. Their 'spatial' impression or experience is quite fake and produced by a different process.

(Pictures or films may not be the ideal tool for testing subjects on their vision and behaviour in real environments and tasks, but they *are* very useful as illustrations or documentations of what one is talking about. But even then, care has to be taken to get colours and contrasts right, to use a relevant point of view and to avoid small sizes or too limited image angles etc. In some of our Dutch *Verkeer-Zien* publications(8)(10) we show some practical examples of such photos, and an outline of a workable method. And finally, simulations can be quite useful for learning tricks, i.e. *parts* of a skill.)

action is needed

And then there's the worst shortcoming of all: subjects viewing images are not partaking in a real task, with all its mental demands and affordances, and with all possible contingent complications of the real world. Involvement in pictorial space during tests may induce some effects of real behaviour, like when immersing yourself in the role of a character in a play, but it is very hard to believe the outcomes of such tests can ever come near the full impact of reality. Truly validating such a research method seems excessively difficult, and decisions exclusively based on it are quite akin to wishful thinking.

get real

I think arguments such as those given above give strong support for taking the notion of a model tableau quite seriously. Judging visual situations and interventions would often profit from considering things from the perspective of the living model tableau, instead of simply following the reasonings derived from a premature theoretical paradigm. Our true 'knowledge' of vision is still very primitive; we live in a period where the paradigms and researches concerning mind and brain are evolving and radiating more than ever(11). There is no excuse for the blunt instrument of stubborn naivety, the fundamentalist attitude of orthodox ideology, or the smoke and mirrors of psychobabble.

We have to gather, study and compare information from everywhere and keep on improving our common sense. While doing so, make sure to follow one important but much neglected rule—*check yourself for confirmation bias*, the tendency to favour what accords with your present opinion. Do not use the notion of the model tableau as an excuse for a rigid opinion. On the contrary, it should allow you to shift your perspective whenever your present view becomes futile. That way, you won't run aground in the shallows of an untenable paradigm. And... experiments are a must.

grand finale

As always, there is more to be said, way more. Consider this: when we open our eyes, *kazam*—there(12) is our model tableau, and it is only then that we can start enumerating its aspects or elements. This is quite contrary to the naive notion that we see individual things and build our visual environment from these.

This problem is related to the different *nature* of what people generally say and think about seeing 'things', as opposed to seeing as implied by their actions etc. or as a neuromental process resulting in mental states or behaviour. Originally, thinkers and researchers took it for granted that seeing 'was for' a simple, self-evident *purpose*; it was *meant* for something. They then looked for the measure of *precision* in a person's seeing something, in seeing its condition, its properties, its boundaries, its size, extent or position etc.—and in its 'meaning' or identity. So they devised tests to determine how accurately subjects perceived a specific something, on the assumption that the ensuing behaviour depended largely on that dimension. In many areas of human endeavour this naive attitude still prevails. It will be clear that this is not the attitude taken in this discussion.

As we know now, vision did *not* evolve for a 'purpose'. Evolution is about *results*; anything detrimental to the organism in its environment results in less chance of propagation, and anything else *may* be conserved. Precision as such doesn't help, as the future is uncertain and full of unpredictable incidents. The quality of seeing is not so much about its 'precision' but more about preparing the subject for *possible* actions in quite a general sense. Its extremely complicated functioning shouldn't be reduced to a simplistic fairy tale. But how it *does* function is a bridge too far for this discussion.

Now let's wait and see whether I succeed in explaining the model tableau.

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please see notes overleaf

Notes

In Verkeer-Zien publications on the web, our photos have a lower resolution than the real things

Notes (1), (9) and (10) are in Dutch, but may contain interesting and beautiful pictures

(1) Brein en L-space

(2) *affordance*; originally created by James J. Gibson and Eleanor J. Gibson, this concept has turned out to be very important for behavioural choice based on vision, cf. articles authored by John van der Kamp (VU University Amsterdam)

(3) more about Viktor T. Toth's papers

(4) Viktor T. Toth's answer to the question "How can a photon travel in every direction simultaneously before it strikes something?" on Quora

(5) view Jan J. Koenderink at GestaltReVision

(6) cf. appendix Gist

(7) cf. Drawbacks of the emphasis on conspicuousness (the first publication mentioning 'model tableau')

(8) *supernormal stimulus* or *superstimulus*; originally created by Nikolaas Tinbergen, this concept is still in common use, e.g. in Amusing ourselves to death

(9) Naar een rustige weg en een onbeschadigd landschap

(10) Uitgangspunten van Natuurlijk Sturen *NS*

(11) cf. appendix New paradigms

(12) Koenderink about *Visual Awareness*

a personal note

The term 'model tableau' was introduced around 1980 and this discussion about it is dated 2018. Why the delay? In 1989 the author was hit by a debilitating illness and, although he kept up with his fields of interest, he only started recovering in 2012.

see next page for appendices

Appendix Gist

In this millenium, a growing number of articles, posters etc. has been published about the ‘gist of a scene’, or simply the ‘gist’. Most of these are interesting enough, some are even very interesting. Some come very near to the notion of a model tableau. I still have problems with most, as there seems something wrong with their assumptions, or methods, or language. Often the text is confusing, as it is not all that clear when ‘scene’ and its ‘gist’ are meant to refer to the physical outside world we are aware of, or to the mental essence of that awareness itself. Another problem is the use of terms derived from the study of central vision for defining the quality of a gist—or even the use of methods derived from such studies. In other words, what’s lacking is the recognition of the autonomous, purely mental character that I’ve attributed in this discussion to the model tableau. Below I list some publications from this field (this short bibliography does not comply with any standard, but assumes the use of Google scholar).

Muriel Boucart e.a.
Scene categorization at large visual eccentricities; 2013; Vision Research

Jeroen J. A. van Boxtel e.a.
Consciousness and attention: on sufficiency and necessity; 2010; frontiers in Psychology

Michael A. Cohen e.a.
Natural-Scene Perception Requires Attention; 2011; Psychological Science

Jason Haberman e.a.
Ensemble Perception: summarizing the scene and broadening the limits of visual processing; 2011; The Whitney Laboratory; 2011

Dmitry Kit e.a.
Eye Movements, Visual Search and Scene Memory, in an Immersive Virtual Environment; 2014; PLoS one

Christof Koch e.a.
Attention and consciousness: two distinct brain processes; 2006; Trends in Cognitive Sciences

Adam M. Larson e.a.
The contributions of central versus peripheral vision to scene gist recognition; 2009; Journal of Vision

Adam M. Larson e.a.
The Spatiotemporal Dynamics of Scene Gist Recognition; 2014; Journal of Experimental Psychology

Antonella Leonetti e.a.
What you see is what you get: motor resonance in peripheral vision; 2015; Experimental Brain Research

Lester C. Loschky
The Importance of Information Localization in Scene Gist Recognition; 2007; Journal of Experimental Psychology

Lester C. Loschky e.a.
Localized information is necessary for scene categorization, including the Natural/Man-made distinction; 2007; Journal of Vision

Lester C. Loschky e.a.
Scene perception from central to peripheral vision; 2017; Journal of Vision

Lester Loschky e.a.
The Effects of Spatial Frequency Content and Color on Scene Gist Perception; 2011; Journal of Vision

Lester C. Loschky e.a.
The role of higher order image statistics in masking scene gist recognition; 2010; Attention, Perception, & Psychophysics

Lester Loschky e.a.
Using Visual Masking To Explore The Nature Of Scene Gist; 2005; Visual Cognition Laboratory, Kansas State University

David Melcher
Accumulation and persistence of memory for natural scenes; 2006; Journal of Vision

Tanja C.W. Nijboer
Recognising the forest, but not the trees: An effect of colour on scene perception and recognition; 2008; Consciousness and Cognition

Aude Oliva
Gist of the Scene; 2004; Neurobiology of Attention

Aude Oliva e.a.
Building the gist of a scene: the role of global image features in recognition; 2006; Progress in Brain Research

Keith Rayner e.a.
Eye Movements and Visual Encoding During Scene Perception; 2008; Psychological Science

Ruth Rosenholtz e.a.
Rethinking the role of top-down attention in vision: effects attributable to a lossy representation in peripheral vision; 2012; frontiers in Psychology

Miguel Thibaut
The contribution of central and peripheral vision in scene categorization: A study on people with central vision loss; 2014; Vision Research

Antonio Torralba
Saliency, objects and scenes: global scene factors in attention and object detection; 2004; Journal of Vision

Raluca Vlad-Debusschere e.a.
A bio-inspired model of central and peripheral vision for scene categorization; 2015; XXVème colloque GRETSI (GRETSI 2015), Lyon, France

Julia Vogel
Categorization of natural scenes: local vs. global information; 2006; Proceedings of the Symposium on Applied Perception in Graphics and Visualization

Panqu Wang e.a.
Modeling the Contribution of Central Versus Peripheral Vision in Scene, Object, and Face Recognition; 2016; CogSci 2016 Conference

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Appendix New paradigms

As stated in the section headed get real in the discussion above, we live in a period where the *paradigms and researches concerning mind and brain* are evolving and radiating more than ever. These developments are of notable importance for the difference between traditional takes on vision and behaviour, and an approach based on the notion of the model tableau. Below, I give a very modest and therefore not all that balanced or inclusive list of publications illustrating present perspectives (as in the Appendix Gist, this short bibliography does not comply with any standard, but assumes the use of Google scholar).

Michael L. Anderson
After Phrenology: Neural Reuse and the Interactive Brain; 2014; The MIT Press

Michael Anderson
Précis of After Phrenology: Neural Reuse and the Interactive Brain; 2015; Behavioral and Brain Sciences

Toby Berger
Living Information Theory; 2003; IEEE Information Theory Society Newsletter

Daniel C. Burnston
A Contextualist Approach to Functional Localization in the Brain; 2016; Biology & Philosophy

Francis Crick e.a.
A framework for consciousness; 2003; Nature Neuroscience

Stanislas Dehaene e.a.
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