

SYNAESTHESIA AND THE RELEVANCE OF PHENOMENAL STRUCTURES IN PERCEPTION *

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Abstract

The aim of the present paper is to sketch a new structural version of the Representative Theory of Perception which is supported both by conceptual and empirical arguments. To this end, I will discuss, in a first step, the structural approach to representation and show how it can be applied to perceptual consciousness. This discussion will demonstrate that perceptual experiences possess representational as well as purely sensational properties. In a second step, the focus will switch to empirical cases of synaesthesia. In particular, I will stress that certain synaesthetic experiences are well-suited to corroborating a structural account of the perceptual mind. The overall picture that emerges in this paper prompts a new view of perceptual consciousness that is ruthlessly structural.

1. Introduction

Perceptual states seem to put us in direct contact with ontologically and causally independent empirical objects and their properties, such as, the shape of a table, the smell of a flower, the pitch of a sound, etc. That much seems uncontroversial. However, controversy arises as soon as one wonders how to conceive the metaphysics of the objects and properties we are aware of in conscious attentive perception. Ultimately, this controversy concerning the nature of perceptual consciousness derives from the arguments from illusion and hallucination, as well as from the causal argument.¹ In fact, what these *arguments from perceptual error* are supposed to highlight is that perception cannot be what it intuitively seems to be, namely, the direct awareness of objects in the external world that exist here and now. The arguments thus seek to establish that empirical objects fail to directly determine the perceptual consciousness of the perceiver. Instead, what we as perceivers are said to be immediately aware of are *inner mental items*, usually called sense-

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¹ See Smith (2002).

data, sensa, sensibilia, qualia, phantasms, impressions, ideas, or what have you. Against this background, the metaphysical status of sensuous properties becomes highly controversial.

Due to lack of space, I shall not go into further details here. In what follows, I will simply take for granted that external objects fail to have any *direct* bearing on perceptual consciousness (I have argued for this at length in Sollberger 2008). Typically, this assumption has been taken to lead to indirect realism and, more specifically, to the so-called *Representative Theory of Perception* (henceforth called RTP): a perceptual experience is an inner sensory experience of the perceiver S that has been appropriately caused by the external physical object x, and the phenomenal properties of which S is directly aware in attentive perception are properties of inner sensory experiences and not of objects experienced. That is, phenomenal properties are neither identifiable with nor reducible to the physical properties of objects experienced. Furthermore, the mental item or state of which S is directly aware is said to *represent* states in the external physical world. Sensory states are perceptual proxies that S immediately senses and by virtue of which S mediately perceives the physical world.²

Based on these assumptions, the goal of the present paper is to sketch a new version of RTP. More particularly, I want to make a case for a *structural* understanding of perceptual consciousness by dwelling on two main issues: a) the structural account of mental representation and b) empirical cases of synaesthesia. Hence, the paper is meant to shed light on the nature of the representation relation which RTP supposes holds between the inner phenomenal and the external physical realm.

Of course, some readers will disagree with the starting point of this paper and reject any form of RTP out of hand. I shall not attempt to convince them of the contrary.³ Instead, those readers are invited to read the paper as dealing with the following conditional claim: if one admits the validity of RTP, then there are good reasons to consider perceptual consciousness in structural terms. In addition, much of what will be said is also relevant to

² For a representative survey of RTP, see, for instance, the papers in Wright (1993).

³ RTP has recently gone out of fashion as a theory of perceptual consciousness. To my mind, its current pariah status is largely unjustified since the arguments in favour of RTP and the replies that have been provided to various objections to it in the past have been almost totally neglected and ignored by the philosophical community. For more on this, see Wright (2008).

perception and perceptual consciousness *per se* and not essentially tied to RTP's specific framework. Having cleared up these caveats, let us start by considering the topic of mental representation.

2. Mental representation

In order to understand the nature of perceptual states, one is well-advised to take into account current empirical data from the *cognitive sciences*. After all, perceptual states are complex information-carrying states that enable cognitive systems to successfully navigate through their environment. Therefore, an adequate philosophical analysis of perception should not ignore the context of cognition and cognitive explanations.

Importantly, cognitive explanations of behaviour routinely refer to *internal mental representations* and relevant operations over them. That is, cognitivists posit mental representations in order to explain the problem-solving behaviour of intelligent creatures. At bottom, 'a representation is something that stands in for and carries information about what it represents, enabling the system in which it occurs to use that information in directing its behaviour'.⁴ Perceptual states are thus conceived of as mental states that represent the external world by means of internal representations.

Of course, there is an ongoing debate concerning the correct account of representations. Several theories have been proposed: causal, functional, teleofunctional, and structural theories.⁵ To my mind, the most promising theory on the market is the *structural* account of representation, according to which representation is understood as a *transfer of structure*.⁶ More precisely, the theory maintains that there must be a mapping (correspondence-function) from objects in the represented domain *B* to objects in the representing domain *A*, such that at least some relations in *B* are *structurally preserved* in *A*.⁷ This mapping or correspondence-function from *B* to *A* can be conceived as a *homomorphism*, e.g., *A* is a

⁴ Bechtel (2001: 334).

⁵ See Fodor (1987), Cummins (1989), Dretske (1995), and Cummins (1996), respectively.

⁶ Advocates of the structural account include, among others, Bartels (2005), Cummins (1996), Gallistel (1990), and Palmer (1978).

⁷ A structure $U = (O, R)$ is characterized by two elements: a non-empty set *O* of objects that constitute the domain of *U* and a non-empty set of relations *R* on *O*.

homomorphic image of B .⁸ Maps are paradigmatic examples of structural representations: a city map of London can represent the streets and houses of London in virtue of preserving a spatial structure that is a homomorphic image of London. Likewise, a photo can represent its subject matter in virtue of mirroring its relevant structure.⁹ In short, the idea is that A represents B *only if* A is a homomorphic image of B , with A and B being defined as structures.

More precisely, this means that the content of a representation is specified by an abstract structural description. This further implies that representational content is not primarily about particular *individuals*, but about *structures* and *relational properties*. Particular individuals are represented only derivatively, namely, in virtue of the fact that they occupy *corresponding logical spaces* in the structurally defined domains A and B . In fine, the present structural account prompts the conclusion that the relations in which objects stand take representational priority over the objects as such.

The structural account of representation needs further to distinguish between the *content* and the *target* of a representation (see especially Cummins (1996) for this issue). Without this distinction, the account remains incomplete, because an infinite number of external physical structures might in principle be homomorphic to a given content. In other words, a particular content underdetermines its target. This problem can be solved as follows: a given content determines all the *potential* targets of a representation, and additional *contextual* factors, such as, causation, intention, cognitive abilities of the organism, etc., fix the *actual* target of the content. Structural similarity or homomorphism on its own is therefore insufficient for representation; it must be supplemented by further contextual factors by means of which the actual target of the structurally defined content is unambiguously fixed.

⁸ The concept of homomorphism derives from mathematics: in abstract algebra, a homomorphism is a mapping between two algebraic structures of the same type that preserves all the relevant structure; it maps identity elements to identity elements, and it is compatible with all binary operations. For a formal definition of homomorphisms and a detailed discussion about how it can be used for modelling the representation relation, see Bartels (2005).

⁹ 'Relevance' is of course not a mathematical concept but has to be added as a further element in order to arrive at a substantive theory of representation. I shall come back to this in a minute.

However, nothing that has been said so far about the structural account of representation suffices to render a representation *distinctively sensory* or perceptual in character. I propose the following: what renders a representation distinctively perceptual is that it *provides guidance for action with regard to x*. That is, the representation must enable S to focus her activities on x; such as, perceptually tracking and demonstratively pointing at x. This inside-out perspective acknowledges the importance of action for a representation-consuming system.¹⁰ Three conditions are thus required for a mental state *A* to *perceptually* represent the external physical world *B*:

- i) *A* must share relevant structural features with *B*
- ii) *A* must have been appropriately caused by *B*
- iii) *A* must provide guidance to S in taking action with regard to *B*

More specifically, this means that i) determines the content of a representation, ii) fixes the actual target of the representation and iii) is what makes the representation distinctively perceptual. Applied to RTP, this yields the following modified account: A subject S can *navigate* the external world because internal sensory experiences are informative by preserving biologically relevant structural properties of the external world, and these structural properties can be decoded and exploited by the representation-consuming system S in order to guide S's actions with respect to the external world.

Before applying this picture to perceptual consciousness, one point should be noted: in the present context of perception, it is the science of *neuroethology* that attempts to provide an answer to the question of which structural properties are biologically relevant to S.¹¹ This means that the concept of 'relevance', which the structuralist has to define in order to make clear which structures are preserved by perceptual representations, will be spelled out in empirical terms. It is not necessary for present purposes to deal with the intricate details of this empirical enterprise.¹² What matters is that the science of neuroethology can be

¹⁰ My account must be distinguished from Anderson & Rosenberg's (2008) guidance theory of perception. In contrast to their theory, which claims that the content of a representation is determined by guidance for action, the present proposal implies that content is structurally determined and guidance for action enters the scene solely in order to explain what makes a representation distinctively perceptual.

¹¹ Keeley (2000).

¹² The interested reader may consult Keeley (2000) for the corresponding literature on neuroethology.

relied on by adherents of the structural approach to show that a clear definition of ‘relevant structural properties’ is available for the domain of perceptual representations.

3. Phenomenal content of perceptual states

In accordance with the requirements of the cognitive sciences, I shall thus take it for granted that perceptual states are *representational states*. This means that perceptions can represent the world veridically or falsidically. The structurally defined representational content of a perceptual experience is a condition of satisfaction of the experience: an experience is veridical iff the world satisfies the condition. That is, S’s experience of an x standing in relation R to y is veridical iff there is an x that stands in R to y. Let us further assume that it is highly plausible to apply this representational scheme to perceptual consciousness as well.¹³ Then, the phenomenal character of an experience can determine a condition of satisfaction for the experience, and this condition of satisfaction is its *phenomenal content*.

With this assumption at hand, the structural framework laid out so far entails that the phenomenal character of an experience can determine a representational content only by means of its *structural* properties. This insight is key to a proper understanding of structural phenomenal content: phenomenal properties *per se* do not represent anything! Phenomenal properties like redness, roundness and so forth are nothing but the non-representational atomic building blocks of the representational structure – i.e. they are *non-epistemic raw feels*. Fundamental units or building blocks are required to make up the structure by instantiating numerous relational properties amongst themselves. This is what phenomenal properties do: they stand in multitudinous relations of similarity and difference to each other and thus build up the structure of the phenomenal character of an experience. Yet, it is only the phenomenal structure *qua structure* that is able to represent the empirical world.

Consider an example: S is phenomenally aware of a red apple placed on a round table in front of her. Redness, roundness, and several further phenomenal properties figure in S’s perceptual consciousness. The present structural account underscores that what matters for

¹³ Siewert (1998: chapter 7).

representational purposes is not the particular ‘feel’ of phenomenal red. Rather, it is by means of *relational* facts – e.g., red is more similar to orange than to green, roundness is more similar to ovalness than to squareness etc. – that phenomenal character determines a representational content. Phenomenal properties exhibit similarity/difference relations amongst themselves and thereby instantiate relational properties that ground the structure of phenomenal character. Phenomenal properties are thus brute sensational units whose intrinsic properties, e.g., their particular feel or what-it-is-likeness, give rise to the representational nature of phenomenal character by building up a phenomenal structure. In sum, inner sensory experiences have both representational and non-representational properties.

Before going on, a short remark about the similarity/difference relations is in order. If asked ‘Why should the phenomenal properties be similar specifically in these respects’, the adherent of the structural framework cannot make reference to external physical objects. That is, the explanation that phenomenal properties are similar to each other because they supposedly represent things and properties that stand in the relation of similarity and difference to each other is unavailable to her. Instead, the structuralist must either a) bite the bullet and treat this as a primitive fact about phenomenal properties or b) speculate that a future theory about the mind/brain relation may come up with such an explanation. Both options have their price, to be sure, but they nevertheless present intelligible positions the structuralist can consistently endorse.

Let’s now summarise what has been said so far. We then arrive at the following definition of *veridicality*:

S’s perceptual experience of the ψ -type is veridical *iff* there exists a homomorphic mapping function from the structure instantiated by the external physical world to the structure instantiated by the phenomenal character of S’s experience, and the experience has been appropriately caused by the external physical structure that usually causes experiences of the ψ -type in S.

It is noteworthy that veridicality thus understood has both conventional and revisionary aspects. Like *conventional* accounts, the above definition requires a match between the content of an inner sensory state and properties of the external world, and this content

match must causally depend upon those worldly properties in the right way. Up to this point, the structurally construed notion of veridicality is still in line with tradition.

Much more controversial, however, are its *revisionary* aspects. Intuitively, doing justice to the phenomenology of experiences seems to imply that what is conveyed to us as perceivers in perceptual experience is a) that the world contains individual objects that instantiate intrinsic properties and b) that these individual objects are the primary focus of perception. Yet, contrary to what is stressed in a), the structural conception of veridicality yields that objects are stripped of their intrinsic properties, i.e., objects determine accuracy conditions only by means of the relations they enter into and not by virtue of their intrinsic properties. This means that intuitions about content that rely solely on phenomenology are misleading and have to be revised. Furthermore, as regards b), one can see that the structural account reverses the order of *experiential salience* involving individual objects and relational properties since it implies that the representational focus is primarily on relational properties and, as previously shown, merely secondarily or derivatively on individual objects. This highlights again that we cannot trust our intuitions about phenomenal content without certain reservations.

Hence, the prize to pay is *partial phenomenal inadequacy*, since structural content does not do justice to the phenomenology in all respects. But some might wonder why one should bite this bullet at all and accept such a revisionary account. Here is one such reason: It delivers the right answer to the empirically pervasive phenomenon of *shifted qualia*.¹⁴ The structural account implies that the perceptual experiences of perceivers who are 'normal' in behavioural, biological and functional respects, but whose phenomenal properties have shifted by comparison, are really on the same *epistemic footing*. It has been rightly argued that there is no reason to *epistemically* privilege one group of perceivers over another group simply because their phenomenal properties are found to have shifted by comparison. The present account naturally accommodates this idea, for experiences of different perceivers which have shifted with regard to their qualia can equally well satisfy

¹⁴ Hardin (2008).

or fail to satisfy the above definition of veridicality as long as they have a common structure.¹⁵

A further reason why one might prefer a structural account is that it is suggested by some empirical cases of synaesthesia. In the remainder of this paper, I would like to discuss this particular special case.

4. Synaesthesia and the relevance of phenomenal structures

Briefly, synaesthesia is an intrinsically perceptual phenomenon where ‘stimulation of one sensory modality automatically triggers a perception in a second modality, in the absence of any direct stimulation to this second modality’.¹⁶ Some phenomenal properties are *reliably and systematically* elicited in response to certain stimuli that are not elicited in non-synaesthetes. Synaesthetes can *hear colours, taste shapes, smell sounds*, etc. In principle, any pairing of the senses is possible, although coloured hearing, e.g., the pairing of sound and sight, is the most common combination. Consider subject MW: in addition to gustatory and olfactory properties, MW perceives tactile properties of weight, shape, texture, and temperature whenever he tastes or smells food. In MW, these sensory dimensions of touch experiences are *functionally related* to flavours and odours. For instance, he synaesthetically perceives the taste of spearmint as a ‘cool, glass column’, and lemon is like ‘a pointed shape, pressed into my hands. It’s like laying my hands on a bed of nails’.¹⁷ Among other things, I want to argue that MW’s case can provide empirical evidence for the possibility of *cross-modal exchange of sensory properties* without the experiences becoming falsidical. Notice that this idea is more radical than the aforementioned case of shifted qualia, for it holds that sensory properties are not constitutively but only contingently associated with their respective sense modalities.¹⁸

¹⁵ Note that a similar reasoning can be applied, *mutatis mutandis*, to hypothetical cases of *spectrum inversion*. See Palmer (1999) for more on the topic of inverted spectra.

¹⁶ Baron-Cohen and Harrison (1997: 3).

¹⁷ Cytowic (2002: 1).

¹⁸ This idea is of course highly relevant for the question of how to individuate the senses. Space precludes a more detailed treatment of this topic.

To begin with, I want to stress that *some* synaesthetic experiences can be treated as veridical.¹⁹ Synaesthetic experiences are a normal variant of human perception and ‘abnormal’ only in that they are statistically rare. Three reasons can be invoked: Firstly, one has to take seriously *subjective reports* of synaesthetes. After all, some synaesthetes have an unshakable conviction that what they synaesthetically perceive is real and valid, and not hallucinatory or illusory. Neither the phenomenology nor the content of these synaesthetic experiences indicate to the subject that something weird or outlandish would be occurring. In short, there is nothing special about synaesthetic experiences that would prompt synaesthetes to treat them differently from non-synaesthetic perceptual experiences. What is more, synaesthetes have been extensively studied by empirical researchers in recent years. These results clearly indicate that there is so far no scientific reason to doubt their subjective reports.

Secondly, it is often true that synaesthesia *enhances* several cognitive capacities of its bearer: the additional synaesthetic sense enhances the ability of reading, writing and spelling, and it also expands the memory faculties by acting as a mnemonic device.²⁰ This seems to suggest that synaesthesia is certainly not a maladaptive biological trait. Quite the opposite, it can mean an *adaptive advantage* for its bearer.²¹ One further reason, then, why one should not treat such synaesthetic experiences as falsidical.

Thirdly, it is instructive to approach synaesthesia in terms of *evolution* and *natural selection*. From a purely evolutionary perspective, the goal of perception is to *maximize fitness*, i.e., raising more offspring! Perception must be viewed as a niche- and problem-specific cognitive function whose purpose is to enhance fitness.²² Importantly, S is able to survive and reproduce only if S can *successfully interact* with the world. And successful

¹⁹ A caveat: the following, admittedly sketchy, description of synaesthetic experiences and of MW cannot be generalized to cover all cases of synaesthesia. It refers only to those synaesthetes who attribute the synaesthetic component of their experience to the *distal* object itself and who do not take their synaesthetic experiences to be illusory or hallucinatory (see especially Cytowic 2002: chapter 2). The phenomenology of synaesthetes is heterogenous, highly idiosyncratic and difficult to describe adequately. In this sense, then, keep in mind that my proposal is *one* way one might interpret subjective reports given by *some* synaesthetes.

²⁰ Cytowic (2002: 29).

²¹ Recent work has strongly suggested that synaesthesia is an inherited condition. The potentially beneficial trait can thus be carried over from parents to offspring. See Harrison and Baron-Cohen (1997).

²² (cf. Hoffman 2009).

interaction is possible only if the subject can adequately *discriminate* between objects and properties. For example, based on perceptual information, S can see, reach, grasp, and finally eat the red apple in front of her. This discriminatory behaviour is an instance of successful interaction with the world based on which S is, in the long run, able to survive and reproduce.

It is crucial to note that some synaesthetes can, up to a certain extent, perform the same discriminatory tasks as non-synaesthetes, based on their synaesthetically induced phenomenal properties. Consider subject MW. As a matter of fact, MW likes cooking. But the way he cooks is quite intriguing for he prepares food according to the *shape* of the food and not its flavour. By trial and error, he administers different seasoning in order to change the shape of, say, the chicken, for instance, making it rounder, sharpening corners in order to apply more heft to the vertical component, or adding some points to the overall shape.²³ This ‘cooking-according-to-shapes’ is impressive, for it highlights that MW’s *tactile* synaesthesias allow him to execute the same activities non-synaesthetes perform with the help of olfactory and gustatory properties. The synaesthetically evoked tactile phenomenal properties guide MW in taking the same actions with regard to food as ‘normal’ perceivers based on gustatory and olfactory properties. Hence, with regard to the coarse-grained behavioural context of cooking, synaesthete MW and any other non-synaesthete can be *functionally equivalent!*

Indeed, MW displays a discriminatory behaviour with regard to food that is an instance of successful interaction with the world. As such it contributes to MW’s survival and reproduction and can thus be treated as a fitness-enhancing perceptual capacity. Finally, that’s why, from an evolutionary point of view, MW’s synaesthesia is *on a par* with non-synaesthetic experiences! And given that we unhesitatingly treat most everyday non-synaesthetic experiences as veridical, it follows that the evolutionary perspective provides reasons for treating MW’s synaesthetic experiences as veridical as well.

In sum, the aforementioned three reasons represent *cumulative* justification for regarding MW’s synaesthetic experiences as accurate perceptual experiences. If this is accepted, in virtue of what feature can both ‘normal’ experiences and MW’s synaesthetic

²³ Cytowic (2002: 86).

experiences be veridical? After all, the sensory properties associated with synaesthetic and non-synaesthetic experiences are phenomenally quite distinct from each other. It seems obvious that the only relevant *experiential* feature they do have in common is phenomenal structure. The answer is: It is reasonable to claim that the structure of perceptual consciousness is rendered manifest in discrimination tasks.²⁴ In our example, MW is able to correctly season the chicken in virtue of the fact that MW can mentally point to the chicken. The phenomenal character of MW's experience instantiates relational properties that enable MW to demonstratively tag the chicken and thus discriminate it from its background. Consequently, if two subjects can be functionally equivalent within a certain behavioural scope, as it is the case for MW and non-synaesthetes, this is evidence for the fact that their experiences instantiate type-identical phenomenal structures. Therefore, synaesthetic and non-synaesthetic experiences can instantiate type-identical phenomenal structures.

The same conclusion can be reached more straightforwardly by acknowledging that there is a reliable and systematic functional relationship between flavours/odors and the synaesthetically induced tactile properties in MW. The existence of such cross-modal functional correspondences is sufficient to show that taste and smell are mapped onto touch. Hence, MW's synaesthetic tactile experiences can in principle build up structures of the same abstractly described type as his non-synaesthetic olfactory and gustatory experiences.

It follows that the only experiential feature MW's synaesthetic touch experience shares with the non-synaesthetic taste and smell experience of 'normal' perceivers is phenomenal structure. As a result, structure turns out to be the only feature that really matters with regard to the veridicality of perceptually conscious states. This, then, is how adherents of RTP may draw upon MW's empirical case of synaesthesia in order to back up the structuralist account of perceptual consciousness.

I have presented my argument by specifically dwelling on MW's case, but it is clear that the scope of MW's functional equivalence with non-synaesthetes is quite restricted.

²⁴ Notice that such discriminatory tasks are used in psychophysics in order to establish so-called psychophysical maps for individual subjects.

However, there is no reason why one should not consider cases beyond MW's limited framework of food and cooking. In so doing, certain cases of synaesthesia become suggestive and supportive of the possibility of what we might call *super-synaesthesia*: i.e., as relates to a synaesthete whose functional equivalence is not restricted to any particular range of behavioural context. That is, *super-synaesthetes* are conceived as having synaesthetic experiences that enable them to carry out the same range of successful interaction with the world as non-synaesthetic perceptual experiences. One might go further and stipulate that super-synaesthetes lost their non-synaesthetic experiences due to some brain damage, so that the super-synaesthete is only conscious of synaesthetically induced sensory properties. For example, if MW were such a super-synaesthete, he would only have tactile experiences whilst tasting and smelling physical things, and these tactile experiences would allow him, without restriction, to engage in exactly the same actions as regards the physical world as do non-synaesthetes based on their taste and smell experiences. The issue to be emphasized here is that, according to the structural account and the definition of veridicality presented above, super-synaesthetic experiences can count as truly veridical, although their sensory properties are *cross-modally exchanged* relative to 'normal' experiences.

Finally, I have tried to show that it is irrelevant how the external physical world is phenomenally represented, as long as the modelling is structure-preserving. Whether a given physical structure tastes like spearmint or tactually feels like a cool glass column or anything else is of no *representational* significance as long as the phenomenal character of the experience enables the subject to make the relevant discriminations between physical objects and their properties. Accordingly, one and the same physical stimulus may causally give rise to sensory experiences with wildly distinct phenomenal characters, and all of these experiences can be veridical. This is so because phenomenal properties *per se* are representationally inert – they are non-epistemic raw feels. What counts is that the

phenomenal character of the experience – be it tactile, auditory, olfactory, gustatory, visual, etc. – mirrors relevant structural properties of the external physical world.²⁵

5. Conclusion

To sum up, according to the structural version of the *Representative Theory of Perception* I have sketched in this paper, inner sensory experiences of which S is directly aware in attentive perception represent the outside physical world by virtue of being *structurally similar* to it. By combining the structural account of mental representation with empirical cases of synaesthesia, I hope to have demonstrated how important an understanding of structure is to the theory of perception and perceptual consciousness.

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²⁵ It goes without saying that several objections would have to be addressed in order to defend this argument about synaesthesia more thoroughly. Due to lack of space, I must postpone this task for another occasion. My more moderate aim in this paper was just to outline the fundamental idea of the argument.

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