Iconic Propositions

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Abstract

I motivate the need for, and then sketch, an *iconic* theory of propositions according to which propositions are *like* or *similar* to their objects of representation. Propositions on this theory are properties that the mind instantiates when it models the world. I connect the theory to recent developments in the propositions literature as well as to a strain of cognitive science that explains some kinds of mental representation in terms of iconicity.

CONTENTS

1. INTRODUCTION

According to Jeffrey King's[1] and Scott Soames'[2] recent theories of propositions, mental representation is fundamental and propositional representation is derivative. The traditional view has things the other way around. Call the recent shift the *mind-first* (M1) movement and the traditional view the *proposition-first* (P1) movement.[3] According to M1 theories, the existence and nature of propositions somehow depend upon the

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[1] See King (2007) for a book-length treatment and his papers in King et al. (2014) for further developments in his theory.

[2] See Soames (2010) for the initial presentation of his theory. See Soames (2015) for a more recent book-length treatment as well as his papers in King et al. (2014).

[3] In this paper, I focus on the work of King and Soames as representative M1 theories. One can find another paradigm M1 theory in the work of Peter Hanks, a theory closer to Soames' than King's. For a book length treatment, see Hanks (2015).

mental processes that give rise to mental, and thus propositional, representation. In this paper, I accept, for the sake of exploring its consequences, the M1 movement. If this assumption is true, it opens the door to the possibility that the mind represents in *different ways*, which may give rise to different *kinds* of propositions.

In particular, I consider the idea in some areas of cognitive science that some mental representation is *iconic*. Here, I have in mind views according to which the mind represents the world by creating simulations, models, and maps of it. Taking these empirical views together with the M1 movement, I sketch a view of *iconic propositions*. To be clear about my commitments, in this paper, I provisionally accept the M1 movement and the cognitive science according to which the mind represents partially iconically and argue for, on the basis of these provisional acceptances, a *sketch* of iconic propositions.[4] I say "sketch" here because crafting such a theory will require numerous controversial choices that, for reasons of space, will remain un-argued for. The overarching purpose of this paper is to provide an argument for the need for a theory of iconic propositions given the provisional assumptions and to provide a recipe template for creating such a theory—and then to provide one concrete sketch.

Given the diversity of the literature on iconic representation, I also want to be clear about the scope of this paper. There are at least three conspicuous literatures on iconic representation:

(1)   The literature on depiction in aesthetics.

(2)   The literature on scientific modeling, diagrams, and scientific representation generally in the philosophy of science.[5]

(3)   The literature on iconic content vehicles in cognitive science.

We'll call my project—of characterizing iconic propositions in an M1 context—IP. IP differs from, and is similar to, (1)-(3). (1) and (2) concern the question of how we use entities external to the mind (pictures, models, e.g.) to represent the world while IP doesn't concern such entities external to the mind. According to the mental processes that I base IP on, "we" don't interpret our own representations (I say more about this below). For (1) and (2), there is a plausible *desideratum* that a theory should make sense of the multiplicity of representational formats—i.e., the vastness of different kinds of pictures and models. IP doesn't share this *desideratum* since biology will severely limit the mental formats that undergird IP. (2) and IP share something

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[4]A web of words and phrases in this area express related ideas: "proposition," "content," maybe even "concept," etc. The reason that I'm choosing the word "proposition" in particular is because I am self-consciously working within the M1 framework in a way similar to King but for a different kind of mental representation—see §2.2 below for my claim that I'm working in a style similar to King.

[5]Sometimes maps can go under (1) or (2). Some of the work of John Kulvicki could fall under (1) and (2). See for example Kulvicki (2013).

in common that isn't present in the picture-focused sub-literature of (1): A key *desideratum* for IP is that iconic propositions must *guide* us in our action in virtue of our ability to reason about the icon's target via reasoning about the icon. This constraint—what Frigg and Nguyen (2016, §1) call the *surrogative reasoning requirement*—is familiar in the modeling sub-literature of (2). Finally, IP and (3) are closely linked and best understood by analogy with King's theory. His propositions are abstract objects gleaned from the mental processes responsible for calculating linguistic meaning. Iconic propositions are abstract objects gleaned from the mental processes responsible for creating mental maps and models. In §2, I make the case for the need for iconic propositions on the basis of the aforesaid assumptions and argue that they are different *kinds* of propositions rather than merely different mental formats that express garden variety propositions. Because of the limited scope of this paper, I don't discuss some of the greatest hits of iconic representation, such as the works of C.S. Peirce or *Tractatus*-era Wittgenstein.

In §3 I present my theory sketch of iconic propositions according to which such propositions are *properties*, and representation is analyzed in terms of the co-instantiation of properties. Numerous questions will then have to be answered: What makes an iconic proposition representational in any sense? What makes an iconic proposition about whatever it's about? When does an iconic proposition accurately characterize its target? Are iconic propositions holistic or atomic? I will answer these questions to form the sketch. To fill out the theory, for the reset of the paper, I consider various propositional issues vis-á-vis the theory.

2. From M1 to Iconic Propositions

I first characterize M1 and P1 and then argue that M1 creates a need for iconic propositions. I then argue that these are a different kind of proposition.

2.1. General character of each thesis

Schiffer (2003) captures how philosophers have traditionally understood propositions. According to this view, propositions are abstract objects that have truth conditions essentially and absolutely—i.e., respectively, it's necessarily true that a proposition has its particular truth conditions, and a proposition has those truth conditions without relativization. Contrast that essentiality and absoluteness with sentences: It's contingently true that sentences have their particular truth conditions, and they have their truth conditions only relative to a given language with its various conventions. Though Schiffer doesn't use this language, traditionally, propositions represent, or have their truth conditions, intrinsically—i.e., they represent the world purely

in virtue of the way the proposition is. Any duplicate of a proposition will represent like the original copy. Last, propositions are mind- and language-independent in two senses. First, their existence doesn't depend on humans or agents of any kind. Second, multiple languages can express the same proposition, but any one proposition doesn't belong to a given language. Quintessential P1 theories include the possible worlds theory of propositions, according to which the proposition that p is the set of worlds where p is the case (or the characteristic function of that set); and the tuple theory of proposition, according to which the proposition that, e.g., Rachel reads comprises an entity having to do with Rachel and something to do with the property of reading, and the proposition is structured in some way related to the syntax of the sentence "Rachel reads," something like the following:

$$\langle R, r \rangle .$$

The kinds of entities involved in the tuple will depend on the theorist's semantic and metaphysical commitments, whether Russellian or Fregean.

The important aspect of this traditional picture is the mind-independent bit. As noted, with the work of King and Soames, the recent propositions literature has taken an empirical turn in which the nature and existence of propositions is in some way mind dependent. To start, we can understand this turn to mind dependence in terms of whether propositional representation is *derivative* or *fundamental*. Some things represent because we confer that power upon those things. The sentences on this page represent in virtue of various conventions set up regarding written language. Thus we humans partially conferred representational properties on written language. But what about our human representational capacities? Are we the ultimate wellspring of representation, or do our mental states represent derivatively because they express propositions which themselves are the ultimate wellsprings of representation? Note that this question is distinct from the question of whether propositional representation is intrinsic or extrinsic. The source of a property and whether an object has that property intrinsically are different issues.

M1 rejects the fundamentality of propositional representation. For reasons of space, I will assume some familiarity with the works of King and Soames, whom I count as the two key mind-first theorists. Both reject the fundamentality of propositional representation and perhaps see the rejection as *the* key innovation of their views. King's propositions are syntactic-semantic *facts* that inherit their representational capacity from the mind, in particular that these facts encode the instantiation function, which they inherit from our minds. Soames' propositions are *act types* the tokens of which involve mental actions, such as predication, and the representational capacity of these acts derive from these mental actions.

The distinction between the *basis* of content and propositions may help illuminate how I think of King's

theory as well as the theory sketch I present below.[6] Herein *content* will refer to mental representations and *propositions* to related abstract entities that a theorist alleges to play various propositional roles. For example, for King, content consists in the mental representations involved in syntax and semantics, and his propositions are syntactic-semantic facts. Content for me will be iconic mental representations and the related propositions, as we'll see below, will be properties. The basis of content is whatever mechanism is responsible for some certain kind of mental representation. One of the brain's functions is to provide information, and thus there is a mechanism that discharges this function: the brain's activity somehow creates an inner representation, a vehicle for content, that expresses some proposition. To have an attitude in a proposition consists in the following, where r is a content vehicle, S is an agent, *Att* is a propositional attitude, and p is a proposition:

(4) $\exists r(S\ Att\ r\ \&\ r\ expresses\ p)$

For S to have an attitude whose object is p is to bear a relation, functionally defined as a given attitude, to an inner content vehicle whose content is p. For the language of thought theory, the content vehicle will be a sentence of mentalease. For a model/map theory, the content vehicle will be some inner model/map. King and I will pay greater attention to r and especially the process that gives rise to r when crafting the theory of p in the second conjunct. Conversely, a P1 theorist can craft a theory of p while ignoring some facts about the mechanism by which the brain carries out its representational function. If the M1 theorist doesn't have good reasons to show that the mind in fact represents the way she claims, then we have no reason to accept the existence of the abstract objects, i.e. her propositions. The propositions-first theorist doesn't face such a dependency.

Since I will be referring back to the mind- and proposition-first views repeatedly, let's set off and define each:[7]

Proposition-First (P1) The thesis that propositions exist, and have their nature, independently of minds, and propositions are the ultimate source of representation while mental representation is derivative.

Mind-First (M1) The thesis that propositions depend for their existence and nature on the mind, and minds are the ultimate source of representation while propositional representation is derivative.

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[6]See McGinn (1989, p.182) for the distinction.
[7]These definitions are from Fitts (Forthcoming).

2.2. FROM M1 TO ICONIC PROPOSITIONS

The purpose of this subsection is to argue for the conclusion that if one accepts the M1 framework, and if one accepts a rich system of iconic mental representation (specified in §3.1 below), then that motivates the project of the next section—to sketch a theory of iconic propositions. The project, however, will be limited in scope: it will be a sketch of a theory of propositions for a *particular* mental representational format. A natural worry for this approach is that different mental representational *formats* shouldn't require different *kinds* of propositions in much the same way that different languages don't require different kinds of propositions. The benefit of the limited approach is that it has the potential to avoid the Benacerraf problem.

If we accept M1, as we provisionally do for this paper, then we commit to propositions that depend on some etiology that is responsible in the end for some kind of human representation. If the M1 theorist is wrong about the etiology that is responsible for her content, then we can call into question her theory of propositions. If mainstream formal semantics is seriously mistaken in the way that we calculate semantic content, then King's theory may be in trouble. But even if the M1 theorist is right about the ground-level processes that are responsible for the content on which she bases her theory, it's important to see the scope of such a theory. An M1 theory will be a theory of *that* kind of content—the kind that a given mental process is responsible for.

King recognizes this point. King (2007, ch3) wrestled with the worry of the origins of his propositions: to explain how our ancestors first brought Kingean content into the world. To explain, e.g., how lexical items came to have semantic values, it seems we would have to appeal to our ancestors' beliefs and desires, so propositions would need to exist in the first place. In his book, King sketches a quick story about how our pre-linguistic ancestors had "proto" intentional states before the dawn of propositions. Later, King (2014, p.60) says a bit more about these proto-intentional states, that they may have been perceptual states that had their own kind of content, which is different from linguistic content. King (2014, fn.19) thus recognizes that the etiology that produces his content should limit the scope of his theory: His book, as he says, should have been titled *The Nature and Structure of Linguistic Content* instead of just content. He then goes on to say the following:

> I believe that many things have content other than sentences of natural languages. Maps, diagrams, perhaps pictures and, most importantly for present purposes, perceptual experiences have contents. In the case of each sort of thing that has content, there will be an account of those contents in the spirit of the present account of the contents of natural language sentences.

Due to limitations of space, time and knowledge, the details of the theory of the contents of perceptual experiences that is in the spirit of the present account of contents of natural language sentences cannot be sketched here.

This is exactly what I'm beginning to do in this paper: I'm trying to give an account of propositions, in the spirit of King's, based on a certain kind of mental content that we have reason to believe may not be linguistic in nature.[8]

M1 theories, then, have a built in limitation: Such theories provide content for a certain kind of mental state. It may turn out that, as an empirical fact, that all content arises from the same process, but I think it's likely that we'll find that humans represent multi-modally. The takeaway from this discussion is that M1 theories, depending on how the empirical facts end up, may result in a kind of pluralism: we may need an M1 theory for linguistic content which may not, as King recognizes, carry over to other kinds of content. Pluralism about propositions is woefully under-discussed.[9] If pluralism has been raised at all, it has been in terms of propositional *roles* that may conflict. I suggest that if M1 is true, a pluralism of a different kind arises—a pluralism of etiologies that give rise to different kinds of contents and so different kinds of propositions.

If this is where the M1 movement has gotten us—basing propositions on mechanisms that give rise to content and possibly forcing us to countenance different *kinds* of propositions for different mechanisms—then maybe the movement is mistaken. Aren't propositions supposed to capture the information that different sentences, languages, and representational formats, including different mental representational formats, express? If this is the case, then we shouldn't end up with different *kinds* of propositions but different mental formats that express the same kind of proposition.

One of the main motivations for M1 is the possibility of solving the Benacerraf identification problem in the context of propositions—call this simply the *Benacerraf problem*.[10] For the possible worlds theory, it's hard to see what evidence would favor the set version versus the function version of the theory, yet both versions perform the same at satisfying (or not satisfying) whatever propositional roles they're supposed

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[8]See also Tyler Burge's work on iconic *content*, e.g., Burge (2010a) and Burge (2010b), especially the latter. I emphasize "content" because Burge (2010b, p.47) would likely classify the iconic base that I discuss below as "intermodal, non-propositional cognitive capacities." For my reasons for using "proposition," please refer back to fn. 4. I thank an anonymous reviewer for these references.

[9]I want to stress here that the pluralism is about *propositions*, which is woefully under-discussed, and not representational *formats*. There is plenty of work on pluralism regarding representational formats: linguistic, perceptual, cartographic, etc.

[10]The problem originates in Benacerraf (1965). See Fitts (Forthcoming), which covers the material on the Benacerraf problem in a propositional context in more detail.

to, and the different versions are not, ontologically, the same class of entities. I.e., the set of worlds where snow is white is not ontologically equivalent to the function that maps white-snow worlds to truth and non-white-snow worlds to falsity. Likewise for the tuple theory: it's hard to see what evidence would favor, for the proposition that Rachel reads, $\langle R, r \rangle$ over $\langle r, R \rangle$, yet both perform equally well by the tuple theorist's own lights, and again, they're not, ontologically, the same entities.

As we've seen, the key feature of M1 is the introduction of an empirical element into propositional theorizing. There are two main, related motivations for this. First, both King and Soames have argued, or perhaps recognized, that it's hard to see how traditional P1 propositions, e.g. set theoretic propositions, intrinsically represent. Why does the function that maps white-snow worlds to T and non-white-snow worlds to F intrinsically represent snow as white? That function seems to represent only in virtue of *our* interpretation. To see this, we could easily swap out T and F with 1 and 0 or a fish and a bird—it doesn't really matter what so long as we have two distinct entities. Or why does the set of white-snow worlds intrinsically represent snow as being white while the set containing some random assortment of things not? The answer, again, seems the same: we interpret the former set as representing the proposition that snow is white.

That we need to interpret these propositions in order for them to represent results in formally equivalent propositional candidates that no possible evidence could discern among—i.e., the Benacerraf problem. This scenario is very similar to the classic Benacerraf identification problem concerning set-theoretic reductions of numbers. In such purely metaphysical situations, as Clarke-Doane (2013, p.472) notes, our concepts resolve indeterminacies, and in many such situations, our concepts don't discriminate among various competitors. In the empirical realm, however, Clarke-Doane notes that causal chains help to resolve indeterminacy in that they help fix the extensions of empirical concepts—water, electron, etc. When such casual chains give out, we end up in a situation that is common in science, especially scientific modeling: brain and behavioral facts, e.g., might metaphysically (not merely epistemically) underdetermine whether, say, all syntax is binary branching or is sometimes *n*-ary branching. Thus if King ends up with multiple propositional candidates vying to be identified with the proposition p, and the empirical facts don't discriminate among the candidates, then he ends up in a common, benign situation that empirical investigators can end up in.

Now what if we decide to say that, supposing the brain represents multi-modally, those modes are merely different formats that encode the same information, and we understand this common informational content with some abstract objects qua propositions. The worry here is that our freedom to stipulate that information removes us from a situation in which causal chains resolve indeterminacies and where their irresolution is

benign. For example, in the depiction case, some have expressed sympathy for the claim [11] that pictures express possible-worlds propositions. This is a plausible suggestion since iconic and linguistic mental representations have radically different syntax. Why not say that both linguistic mental representations and iconic mental representations both express possible worlds propositions? The problem, though, is, which version? The set version or the function version? Here we face the Benacerraf problem that moving to M1 was supposed to eliminate. I won't pretend that this worry is unanswerable, but I present it as a reason to think that M1 leads us to the view that multi-modal representation leads to different kinds of propositions, to a kind of pluralism, and not merely multiple formats that express the same kind of proposition.

3. ICONIC PROPOSITIONS: THE THEORY SKETCH

To sketch an M1 theory based on an iconic basis of content, we first need to get clear on just what that basis is, which I consider in the next subsection. In the following subsection, I state the theory template and theory sketch and then consider the theory sketch in relation to various propositional issues.

3.1. THE ICONIC BASE

The literature on iconic mental representation, in philosophy, psychology, and elsewhere, is vast, and I don't intend to provide any kind of thorough survey here. The idea starts in philosophy with Aristotle and runs through Aquinas and Hume,[12] and in the modern era runs through F.P. Ramsey.[13] In the contemporary literature, Fodor (2007) and others have defended the view that perceptual content is iconic. Heck (2007) proposes mental maps as one among other examples of non-conceptual content, which humans employ in cognition, along with conceptual content. Braddon-Mitchell and Jackson (2007, ch.10) offer mental maps as an alternative to the language of thought, and so seem to claim that thought in general occurs in a map-like medium, and Armstrong (1973) presents a similarly holistic view of map-like mental representations. The representations in some computational theories of cognition, e.g. the *s-representations* from Cummins (1989), are iconic and provide an alternative to the language-like representations of the standard interpretations.

In psychology, mental models are the dominant iconic paradigm.[14] According to the mental models perspective, humans and other organisms represent reality by simulating it with models and by manipulating

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[11]E.g., Grzankowski (2015, p.152).

[12]See Jacobson (2013) for historical views of iconic representation.

[13]See Ramsey (1931) for the "belief is a map by which we steer" quote.

[14]The idea starts with Craik (1967), and Phillip Johnson-Laird is perhaps the biggest contemporary proponent.

those models. Properly understanding the mental models perspective will forestall a possible confusion. If we were to understand a mental model of a library, we wouldn't have an egocentric, two-dimensional internal picture of the library. As Johnson-Laird (2006, p.28) notes, mental models are akin to the non-ego-centric three-dimensional spacial arrays in computer storage.We would construct such a picture *from* a mental model, similar to the way a computer employs a three-dimensional array, analogous here to a mental model, to project a two dimensional picture on a screen. With this small sampling of iconic representation, let's discuss iconic representation in general as a base for iconic propositions.

To motivate iconic propositions, an iconic basis of content needs to satisfy certain properties. *Structure*, in the context of mental representations, is deployed to make sense of two key *desiderata* for a theory of mental representation: productivity and systematicity.[15] A system of thought is productive if there is, in principle, no upper bound to the construction of novel thoughts and is systematic if there are systematic connections between the kinds of thoughts thinkers can think. For example, if one can think "John loves Jane," then one can think "Jane loves John" or "John loves. . ." for any object that you fill in the ellipses with. Philosophers in this area argue that we must appeal to the structure of thoughts to explain how they are combinatorial in a way that satisfies productivity and systematicity.

Productivity and systematicity are easy to come by if thinking occurs in a language-like system—a language of thought (LOT)—with a structure similar to first-order logic, with the mechanisms of connectives, quantification, predication, etc. While LOT theorists often speak as if their thesis requires thought to occur in a medium like first-order logic, the official definitions given by Fodor only require that thought proceed in a medium that has a syntactic structure and compositional semantics.[16] What I want to note here is that various philosophers have argued that certain iconic content is structured, systematic, and productive, which is my main concern and that, as such, that content qualifies as a kind of language of thought in a weak sense.

Let's see what notion of structure may be relevant to iconic content. Braddon-Mitchell and Jackson (2007, p.178) claim that a content is structured if the similarities and differences of content are systematically related to the similarities and differences of the objects of the content. If we have representations $R_1, R_2, ...R_n$ that correspond to states of the world $W_1, W_2, ...W_n$, differences in the Ws will correspond to differences in Rs. The level at which we find this correspondence may be highly abstract. To use an example from Braddon-Michell

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[15]This notion differs slightly from the propositional context in which a proposition is structured if it comprises semantically significant parts.

[16]I found a distinction between strong and weak sententiality that I'm working from here in Rescorla (2009, p.397)—strong sententiality requiring first-order logic like structure, and weak requiring only syntax and combinatorial structure. Resorla notes that the official definition of mentalease from Fodor (1987, pp.134–8) only requires the weak sense. Also see Camp (2007, p.152).

and Jackson, Arabic numerals are structured representations the objects of which are numbers since there is a systematic correspondence between the similarities and differences of the Arabic numerals and their number objects. The idea when applied to iconic contents is that there will be systematic differences and similarities in iconic representations that correspond to similarities and differences among their objects.

Braddon-Mitchell and Jackson (2007, p.181–182), Camp (2007, pp.152–154), and Rescorla (2009, §7) all argue, in different ways, that iconic representation can proceed in a medium that is combinatorial, systematic, and productive. The specifics of the arguments for those properties will depend on the details of the iconic representational system, and here I merely want to mention how this might work. Braddon-Mitchell and Jackson and Camp both focus on maps in the ordinary sense. Both argue that such maps contain reoccurring, combinable elements. As Camp (2007, p.154) puts it, mental maps are made up of "recurrent formal elements that make a common semantic contribution each time they occur." There is no upper limit to recombining these elements—satisfying productivity. What's more, if one can entertain one combination of locations and relations among them, one can entertain those elements in a nearby configuration, satisfying systematicity. The above two philosophers have ordinary maps as their paradigm, but there are many other formats that iconic content can take. For example, Rescorla (2009) notes, according to one account of a kind of iconic representation, cognitive systems employ vectors that participate in computational models that interpret those vectors in terms of Euclidean distance metrics. Since these vectors comprise coordinates, an organism that can entertain a mental map vector composed of a certain set of coordinates can also entertain another mental map comprising the same coordinates swapping one out for another, satisfying systematicity.[17]

Finally, mental representations—understood broadly as any semantically evaluable mental state—play different roles, and not every role is suited to underwrite a theory of propositions. It is common to distinguish three levels of explanation regarding the mind: the hardware (neural level of the brain), software (abstract structures that the hardware system realizes to engage in cognition), and the personal level (conscious experience, beliefs, desires, etc.).[18] The basis of content for a mind-first theory of propositions will be the software level—the level at which the mind represents that is common enough among humans to ground a

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[17]This point is supposed to illustrate that iconic content can be systematic, but Rescorla isn't primarily interested in systematic *human* mental representations here. Braddon-Mitchell and Jackson (2007), on the other hand, do claim that *all* representation occurs in the medium of mental maps, which they claim are systematic.

[18]Here I am following the three-part distinction from McGinn (1989, p.185). This distinction may also bring to mind the common three-part distinction among the computational, algorithmic, and implementational levels due to David Marr (see Marr (1982)). I only want to be committal enough to saying that the basis of content in the theory sketch is sub-personal. See also the next footnote.

theory of propositions.[19] For the purposes of this paper, any software level iconic content, such as mental maps or models, will serve as a basis for iconic propositions. Officially, I don't want to commit to which cognitive theory best captures the software level of iconic mental representation, but for reasons of using a single word when I'm not talking about a specific kind of format, I'll use "model."

3.2. RECIPE TEMPLATE AND SKETCH

To give an M1 iconic theory of propositions, I answer these questions. Below each question I state what my answer, for this paper, will be.

Iconic Proposition Recipe Template

(Q1) In virtue of what does an iconic proposition characterize the world and how, metaphysically, ought we understand that characterization?

- Icons characterize the world in virtue of isomorphism. I understand iconic propositions' characterization of the world, metaphysically, in terms of property co-instantiation.

(Q2) Iconic propositions, to be propositions, need to have determinate content, but how?

- This question is somewhat complicated, but natural teleology will play a major role.

(Q3) Does a theory prioritize holistic or atomistic propositions? That is, to characterize an agent's mental state, do we first characterize large propositions from which we derive atomistic propositions—e.g., do we, as a possible worlds theorist might do, first characterize an agent's entire mental state in terms of a set of worlds and then derive the propositions that the agent's individual thoughts express; or do we start straight away with the propositions that individual beliefs express and take the holistic belief state as the sum of those atoms?

- I prioritize holistic content and employ possible worlds as a *model*, in the sense of scientific model, of iconic propositions.

(Q4) How do we understand basic propositional issues, such as logical relations, accurately and inaccurately characterizing the world, etc.?

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[19]This is clearly where King grounds his theory, and Soames is less clear on this issue, though his theory would make the most sense if his mental actions took place at the software level. For example, Soames often uses perceptual examples—when we see that a ball is red we predicate redness to a ball. Presumably we don't consciously perform such actions.

- At the level of ontology, basic propositional issues are understood in terms of property co-instantiation and restrictions thereof, and the analysis of these issues is cashed out in terms of possible worlds *models* in the sense of scientific models.

I'll answer questions 1-3, then state the theory, and then move to Q4.

Q1. The thesis that the depiction relation in the aesthetic context consists in similarity, resemblance, isomorphism, and related notions is by no means unchallenged.[20] Similarity based concepts are, in my estimation, more popular in the scientific context,[21] and there are sophisticated accounts of surrogative reasoning based on isomorphism, namely Swoyer (1991). Swoyer captures the ideas of isomorphism and surrogative reasoning here:

> [T]he pattern of relations among the constituents of the represented phenomenon is mirrored by the pattern of relations among the constituents of the representation itself. And because the arrangement of things in the representation are like shadows cast by the things they portray, we can encode information about the original situation as information about the representation. Much of this information is preserved in inferences about the constituents of the representation, so it can be transformed back into information about the original situation. (p.452)

Isomorphism is the first major part of the theory I state below, and officially, I implicate isomorphism generally in the theory. What I mean by this is that there are different *orders* of isomorphism, and, at this point, I don't commit to any order or other being *the* correct order of isomorphism. I say this because first, cognitive scientists are still actively investigating this question, and second, different types of orders may capture different modes of iconic representation. I should note that various authors have chosen second-order isomorphism as their preferred order. The kind of isomorphism that Swoyer describes above is second order. The idea is that, while first-order isomorphism will typically capture the sense in which a representation literally resembles its object, second-order isomorphism will capture similarity in abstract relational structure.[22]

The pattern of relations contained within an iconic representation will be highly complex, but in order to state the theory, let's zero in on the complex property of having *that* pattern of relations. Entertaining a mental model, then, will consist in the mind/brain instantiating this complex property, and successful

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[20]E.g., see Suárez (2003) and Greenberg (2013).

[21]E.g., see Weisberg (2013) for a pro-similarity account that eschews isomorphism among other precisifications of similarity. But see Suárez (2003) for arguments against similarity and related concepts.

[22]For cognitive scientific literature on the second-order view, see Shepard and Chipman (1970) and Choe (2002).

representation will consist in the *co*-instantiation of properties—the mind's of a pattern of relations and the world's instantiation of the complex property of the mirrored pattern of relations. And it is this mirroring of relational patterns that partially underwrites the usefulness of these representations.

If we set aside for a moment the niceties of the context of propositions and the order of isomorphisms and such, the general idea is that a model comprises a certain pattern of relations—it will be, at the software level and at some level of abstraction, some way or other. And when the model is useful given some purpose, the world will be the same way, under isomorphism. And the idea stays the same when the iconic representation becomes more abstract—e.g. with a diagram. But isomorphism is only one part of the sketch because isomorphism is all too easy to come by. Anything is isomorphic to anything else *under some interpretation*. A model doesn't represent merely because it's isomorphic to some aspect of reality. It represents because it has the right kind of isomorphism to make it useful to us. It is our *use* to which we put the model *plus* its pattern of relations' being isomorphic to some aspect of reality that explains how the model comes to represent reality. Surely it cannot be "we" who interpret our own inner iconic representation on pain of an infinite regress of inner homunculi.

Q2. The task at hand, then, is to secure a determinate content for an iconic proposition. Toward that end, I first want to tease apart two questions that Ramsey (2016) separates. Ramsey considers, on the one hand, what makes something count as a representation in the first place, and on the other, what makes that representation have the content that it in fact does. For the first hand, Ramsey argues that to count as a representation as such, some state must satisfy a certain kind of *role*—representation, in other words, is a functional kind. Thus, to argue that a state represents is to argue that a state plays a certain role. For the second hand, a representational state has the content that it does in virtue of standing in some relation to its target. The two questions, then, are, in virtue of what does a state function as a representation? and in virtue of what does a given representation have the content that it has? For the first question, Ramsey answers that a given state counts as a representation at all because those states are icons—they are models that comprise constituents that stand in for the objects of representation, and these icons guide agents in the world via surrogative reasoning. I agree with Ramsey on this question. For the second question, there are two broad options that, at this point, I'm indifferent between. The first option that Ramsey recommends is that representations stand in familiar causal–informational relations to their targets. On this option, a given representation may count as a representation in virtue of, e.g., having a model-like structure with constituents that stand in for various aspects of reality, and those constituents stand for what they do in virtue of their causal connections to their targets. The second option is also familiar—what I'll call natural

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teleology.[23] On this option, an icon has the particular content that it does in virtue of the use to which a cognitive system puts it. In what follows, I'm going to explore the teleology option.

To show that iconic propositions represent intrinsically and determinately, we show that iconic content can be "run" in a cognitive system that lacks any kind of interpretative intelligence, yet the use to which the icons are put, in addition to isomorphism, underwrites the icons' representative powers. Ramsey (2007, §6.1) calls this the "mindless strategy" and illustrates it with a two-step analogy. The first step involves an intelligent agent's interpretation conferring representative powers upon an icon; the second step involves removing the agent while keeping the guiding function of the icon, the result being that its representational capacity still remains. The analogy compares the iconic view with another prominent view of representation—the "receptor view"—in which neural states represent because they reliably detect certain external conditions. To illustrate:

Step one. Two windowless cars, car A and B, respectively, traverse an "S"-shaped path. They do so as follows:

- *Icon*. A driver guides the car with a model of the "S" combined with dead reckoning (estimating direction and distance to then calculate estimated location while traveling).

- *Receptor*. When the car approaches a wall, sensors on the front bumper push inward, closing a circuit, which illuminates a light, which the driver uses to guide the car through path.

Step two. Now we remove the drivers, and the cars traverse the path as follows:

- *Icon*. The model is replaced with an "S"-shaped groove, isomorphic to the track, in which a rudder runs. The rudder moves along the groove and controls the steering wheel via arms connected to the rudder, guiding the car through the path.

- *Receptor*. When the car approaches a wall, sensors on the front bumper push inward, closing a circuit, which controls a rod that pushes the steering wheel in the opposite direction, which guides the driverless car through path.

Once we remove the driver, the most natural way to interpret the process in the *receptor* car is that a mere causal process guides the car. There is no component of the process—the sensors, the circuit, the rod—that seems representational. On the other hand, the best way to explain the success of car A in step two is that the groove is a model, a representation, of the track. At some much, much more complicated level, the

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[23]See McGinn (1989) for the phrase. See also Cummins (1996) and the work of Ruth Millikan, e.g. Millikan (2002).

iconic representations that guide our behavior are analogous to the groove, and the conclusion that Ramsey draws, that I want to employ, is that our cognitive systems can mindlessly use iconic representations to target aspects of reality, and in so doing, the icons acquire their representational powers.

Natural teleology can solve another problem for the iconic content—that such content is indeterminate. This is perhaps one of the most obvious worries for any theory of representation based on isomorphism or similarity. The worry is that a single iconic representation can target any object—as Fodor puts it (tweaked for our purposes) one model may represent a chess game or the Six Day War if, at some level of abstraction, the two targets are functionally identical. The source of this objection comes from thinking about everyday models as well as scientific models. We're familiar with, at least before the days of Google Maps, scrawling a map of one's neighborhood that could serve to represent any number of things given the right purpose. But everyday and scientific models, maps, etc., require interpretation from us—they only extrinsically represent. However, *if* we pair such iconic representations with a use to which they are put, then we do get a unique content. We wouldn't be impressed if, in the midst of discussing directions via my hand-drawn map of my neighborhood, someone objected that my map represents Napoleon's strategy in the Battle of Austerlitz. Natural teleology performs a similar purpose except that the "interpretation"—or the use to which it's put—isn't extrinsic, and this use can pin down what an iconic representation represents.[24]

This determination of content also resolves another immediate worry for the theory: The representation relation should be typically asymmetric, for the objects of representations don't represent their representers. Language-like representation obviously satisfy this *desiderata*. I've grounded the representational capacity of my propositions partially in terms of a kind of similarity, in particular a kind of isomorphism. Yet similarity is a symmetric relation. If this is the case, then I face an objection: If iconic proposition p represents r, then r will also represent p, which seems strange at the very least. The solution is this: Iconic propositions and their targets may be symmetrically isomorphic, but the targets of such propositions aren't put to any use and so don't represent anything.

Q3. The last decision point is a priority issue. Iconic propositions may not encode the entirety of an agent's mental state at some time. Still, such propositions can encode lots of information. Yet at the very least, to give a sketch of a theory of propositions, we need individualized propositions. Let's first consider,

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[24]King's syntactic–semantic facts require human interpretation to endow syntactic concatenation with the semantic significance without which the facts wouldn't intrinsically and determinately represent. King (2007, ch2) first introduced this interpretative element. As noted, any kind of map, diagram, etc., represents extrinsically, and without interpretation, doesn't represent anything at all. Since I'm sketching an M1 theory, the mind is the ultimate source of representation, and mental use and interpretation endows the propositions of this sketch with determinate, intrinsic content.

at an intuitive level, how we may extract such propositions. If the content of an agent's mental state with respect to some issue at some particular time is a complex, holistic model, then an individualized proposition will be some part of that model. Just as a map may represent some expanse of land, some portion of that map represents a part of that land. More abstractly, a Venn diagram may represent various properties and relations between sets as a whole and particular relations and properties when we consider an aspect of the diagram—that, e.g., the intersection of two sets is non-empty. In both of these cases, the holistic representation has priority over the less holistic representation—the intersection, e.g., only represents what it does in virtue of its function in the overall diagram. If we can understand a mental model as a complex property of having a certain pattern of relations—one that a cognitive system uses to target, via isomorphism, some aspect of reality—then an individualized content will be some portion of that mental model. In other words, it will still be a property of having a certain pattern of relations, but the pattern of relations will be some portion of the agent's more holistic content. This just-mentioned property will officially figure into the statement of the theory below, but I want to flag that I am about to discuss possible worlds *precisifications* of this property. There is an unfortunate double use of the world "model": mental models and scientific models. These precisifications are scientific models.

The process of extracting individualized contents from holistic content isn't new, especially for possible worlds theorists such as David Lewis.[25] And there is, in fact, a close connection between possible worlds and iconic representation.[26] Here is a typical strategy: give a functionalist pairing of sets of possible worlds with mental states the content of which are mental models. Consider as an example my iconic representation of the university library.[27] The relevant iconic content may be a highly complex, albeit incomplete, model of the library. Now one aspect of this content is that I represent the world in such a way that the logic books at the university library are near the middle of the twentieth floor. The way that we would extract this content from my holistic model according to the above strategy is that given my desire to check out a logic book (for example), if the aspect of my model regarding the logic books is accurate, then it would successfully steer my behavior to satisfy my desire. We can then pair possible worlds with iconic mental states such that if a given world were actual, then the agent's desires would be satisfied by the actions caused by the iconic mental state. Again, this set of worlds is the *theorist's* tool for precisifying, out of my holistic content, a single aspect of it that corresponds to what we might specify with a sentence. For the sake of stating the theory in

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[25]Lewis (1986, pp.32-34) gives four options to extract individualized content.

[26]Mental models theorists, Johnson-Laird in particular, have used possible worlds to precisify mental models.

[27]See Braddon-Mitchell and Jackson (2007, pp.190-191) for this analysis.

the next paragraph, let's say that there is a *content pairing* between a holistic content and an individualized content when in fact there is such a pairing on a process like the one I just described.

Statement of theory. To recap: According to the mind-first trend, the fundamental source of representation is the mind upon which all others forms of representation, including propositions, are derivative. The mind-first movement requires us to pay attention to the details of mental representation. Toward this end, we've considered a diverse view according to which the mind represents partially iconically. Iconic representations represent not only in virtue of isomorphism, but also, according to the option we took, in virtue of a cognitive system's natural teleology—a kind of use that doesn't require inner homunculi—that delivers a determinate content for the system. I've understood an isomorphism between mind and the world as the sharing of a pattern of relations, and I've considered the property of having some particular pattern of relations as a way of specifying that content. We've then considered aspects of that highly complex property that are an individualized content, and we've sketched different ways to precisify that individualized content. With this in hand, we can now give a statement of the sketch that we'll refine and expand upon:

Iconic Propositions (IP) An iconic representation c (a mental map, model, diagram, etc.) is a complex pattern of relations that form an isomorph that a cognitive system uses to navigate the world. The content of c is the property i of having the pattern of relations involved in the isomorph. An iconic proposition p is a property r that isolates an aspect of i for which there is a content pairing with i, and the mind represents the world veridically in terms of p when both the mind and world instantiate r.

Q4. I first consider how the sketch deals with basic issues, which will set us up to discuss the more complex, contemporary issues.

General content. Can iconic propositions represent anything general? If they couldn't, I wouldn't take that as a damning objection. We would still have a software-level process that leads to non-general content for which we should still account. But I think iconic propositions can represent general facts, and the focus on concrete-style maps may lead one to think otherwise. For example, diagrammatic content, in my view, represents general facts—e.g., a diagram may represent that all dogs are mammals, which isn't about any particular dog or mammal.

The claim that icons are always specific has the most force in the context of depiction in the aesthetics literature. The claim is much less plausible in the cognitive psychological literature on mental models and maps. As noted, mental models are *not* egocentric visual images. A cognitive system may use a model to navigate some particular task, say getting a particular book from the library, or an agent might model the general structure of a building type. For example, there is a particular layout for apartment buildings in

the city that I used to live—all the building generally had the same spatial layout. If I use the same abstract structure to navigate all such buildings, then that structure is in some sense general.

Note, however, that here I need not take a stand. Even if iconic mental representations are always specific in their representation, this is not fatal to my project in this paper. My goal is to provide an account of propositions for the modality of iconic mental representation should such representation exist. I shouldn't take a stand, at this point, on the nature of these cognitive representations, whether they be always specific or sometimes general. If we take the M1 movement to heart, and we need different propositions for different modes of representation, and one of those modes ends up having only specific content, then so be it. If this ends up being the case, and the reader finds this project overly narrow, then that is really a worry for the M1 movement, and it is not my intention to mount a defense of M1.

Misrepresentation. There is no representation without misrepresentation, and there is some disagreement about how misrepresentation works among those that write about iconic representation.[28] Misrepresentation comes about from a disconnect between a representation and its target. The disconnect on the traditional picture is between what an externally existing object describes and how the world is. For IP, the disconnect comes between the content that isomorphism and natural teleology fix and how the world is. If, according to the foregoing sketch, we understand veridical representation in terms of the co-instantiation of properties— the mind and the world both instantiating the property of having a certain pattern of relations—then it's natural to understand misrepresentation as the asymmetric instantiation of properties. But the world instantiates all kinds of properties that the mind doesn't instantiate, and in many cases we don't want to say that we're misrepresenting the world. Misrepresentation, for IP, is a disconnect between the fixed content of an icon plus natural teleology and how the world is—a disconnect between an "intended" target and the actual target. This idea should be familiar on the analogy with everyday iconic content. We may intend to model a certain part of a neighborhood for directions to a party but misrepresent the streets, or intend to capture family relations with a diagram and misrepresent those relations, etc.

Non-existant relata. A necessary condition on the satisfaction of many relations is that the *relata* of that relation exist. If the loving relation obtains between Abelard and Heloise, then both need to exist. Not so for representation. Agents can represent the nonexistent: E.g., I can represent Pegasus, though such a being is nonexistent. It's important to note that accounting for non-existent entities, properties, etc., implicated in a *relatum* of the representation is a general problem. Here is how IP makes sense of this: The mind instantiates a property that the relevant chunk of reality does not instantiate. The reason that a given simulation represents

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[28]See Cummins (1996) for a detailed view.

some non-reality is because that's the use the cognitive system puts the model to.

Shareability of content. The way that IP accounts for the shareability of content is perhaps one of the most interesting aspects of the theory in my view. Above, in the midst of stating the theory, we considered how the propositions of IP come to have determinate content rather than representing anything given the right purpose. Considering the key *desiderata* of shared content will give me a chance to elaborate on the determinacy issue.

It appears to me that some philosophers take the notion of shared content quite literally. When two people believe the same thing, the content of the states is *literally one and the same abstract object*—the proposition. Similarly for natural language sentences. This is the case for tuple theories as well as possible worlds theories: You and I both believe that snow is white in virtue of our mental states having literally one and the same proposition expressed, whether it be $\langle W, s \rangle$ or the set of snow-is-white worlds, etc. Some modern writers hold to this literal picture, for example Schiffer (2003). Traditionally, then, to share content is to glom onto one and the same object.

It's not clear to me, since Soames and King don't address these issues directly, how we should understand their vision of shared content. It seems to me that Soames' picture must be different, for when you and I believe the same thing it is in virtue of *doing* the same thing on his picture: When you and I both believe that Rachel reads, we both predicate the property of being a reader to Rachel (and are disposed to that predication in a committal way). Though we engage in separate act tokens, both of our tokens are of the same predicative act type. This mutual participation in the same act type should, in my view, make sense of shared content on Soames' theory.[29]

IP diverges from the traditional picture of shared content. My notion of shared content consists in a notion of sharing that we're familiar with—that of properties. Various minds will process information in different ways, but, when they represent the world as being one way or another, they do so in virtue of an agents' iconic contents representing it as such. What these minds share is that, at some level of abstraction, they're all *similar*—both with each other and with the object of representation. And they're all similar because they all instantiate the same property—a sample (or attempted sample) of the world. So when agents share content, it's not in virtue of accessing the same object but in virtue of being relevantly similar to one another.

One may worry that iconic representation is a poor basis for mind-first propositions because it just seems that mental maps, models, and others kinds of iconic representation are just too variegated from person to

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[29]It's unclear how to understand King on this issue. I would want to know more about how King understands the nature of the syntax in his theory. If his syntax is idealized psychology, then I think we should understand his notion of shared content in a way similar to Soames'.

person to ground any notion of shared content. I think there is something to this worry, but I think it is a general worry for the mind-first program, which I want to quickly address.

The worry is that since M1 theorists base their propositions on actual mental processes, minor differences in those processes may hinder our ability to give an account of shared content. For Soames, e.g., we may consider how acts are individuated. It seems plausible that if we take a series of actions, and rearrange the order of those actions, then the result is two act tokens that don't fall under the same type.[30] But if this is the case, then trivial differences in act order will result in different propositions when what we want is shared content. For example, suppose you and I are watching a subtitled foreign news broadcast, and the following line flashes on the screen:

(5)   Fighting in Aleppo intensified, and Turkey entered the Syrian conflict today.

I read the sentence normally, from left to right, and someone blocks your view so that you read the conjuncts out of order. We both come to believe the same thing, and although the actions involved in either of our act tokens were the same, they were performed in different orders, resulting in different act types and thus different propositions. Soames' account, because of this temporal aspect, is especially vulnerable to the worry underway—that minor differences in the basis of M1 propositions will lead to distinct propositions when we want the same proposition. For example, the series of actions in processing $\ulcorner$If $p, q\urcorner$ may be different from $\ulcorner q$ if $p\urcorner$ though we would plausibly want the same proposition here.[31]

For King, we don't have this worry since there is no temporal aspect to the order in which semantic values, given some syntactic structure, are composed. Yet for King, much depends on exactly what the syntactician and semanticist are up to at a metaphysical level. While there is a strain of semanticists that see themselves as describing a Platonic grammar, many semanticists and syntacticians see themselves, if only implicitly, as modeling psychological processes at some level of abstraction. If King's basis of content consists in psychological models of mental processes, then there are possibly minor differences in the way that minds calculate linguistic content.

These are complicated issues, but my point in bringing them up is that accounting for the sharing of

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[30]Soames doesn't discuss whether he's committed to this individuation of acts, but the individuation conditions seem extremely plausible to me. If I go to the store and then go to the bar, and you go to the same bar and then the store, we seem to engage in separate acts.

[31]An anonymous reviewer made the interesting suggestion that, on Soames' account, a proposition only consists in the final mental action. At the time of this writing, Soames' most recent work, in my view, suggests otherwise. Just one example: "That is the idea behind propositions as purely representational cognitive acts or operations, or sequences of such. In the simplest case, the act is predicating a property of an object. More complex propositions are more complex acts or sequences, but the idea is the same" (Soames, 2015, p.20).

content is a general kind of difficulty for the M1 theorist, and IP doesn't face a distinctly threatening version of it. At some level of detail, individual iconic representations will surely differ from brain to brain. But if a crowd of people have mental models that all represent the logic books as on the twentieth floor of the library, then there will be some property based on that representation that all of their minds instantiate, and they will share content in virtue of that. If anything, IP fares especially well with the dilemma currently under discussion because the notion of sharing is the familiar notion from the sharing of properties. Many red objects can differ in innumerable ways, and may even differ in their exact shade of redness, yet they may all share the property of being red. Similarly for iconic representation: many minds may vary in exactly how they represent some given fact, but they can still all share a property in common.

Logical relations. The idea of truth or satisfaction conditions starts from the idea of simulating a fact that obtains. Now this might not fit the mold of traditional truth conditions, but this isn't a worry: We need some understanding of what it means for the content of someone's mental state to be accurate, and IP gives us that in terms of property co-instantiation. And we can begin to understand the logical relations that exist among mental contents in terms of properties; one can't model something's being maroon without modeling its being red, one can't model a square's having three sides, etc., which means that certain kinds of properties instantiate together, some can't co-instantiate, etc. And given that much of the iconic representation literature, mental models in particular, was introduced to account for reasoning, much of that literature can be worked into an account of the logical relations that hold among mental contents.

The Benacerraf problem. The Benacerraf problem arises, to recall, when we have multiple propositional candidates to choose among the choice of which is arbitrary. This problem is most salient when we have multiple formal objects with the right propositional properties, such as grain and structure. This is the classic propositional version of the problem that plagues set theoretic theories of propositions. IP identifies propositions with properties, not formal devices. The decision to employ such formal devices is what leads to the surfeit of choices. If IP had a Benacerraf problem, it would arise from indeterminacy of the mental representations—if we had no way of choosing which of any iconic content may represent some way the world is because any icon can represent anything with the right interpretation. If this were the case, then to choose one icon over another would be arbitrary. But we provided one way of pinning down unique content, which would prevent a Benacerraf problem of this kind.

4. CONCLUSION

This paper has been but a first step to fill out the consequences of the change in propositional theorizing that King and Soames have initiated. I have not argued for this change directly, only having assumed it. If we are to take this change seriously, then it calls for propositional theorizing that pays close attention to the empirical details of mental representation. This paper has attempted to begin this in the context of non-linguistic representation. The idea that iconic formats express propositions is not new, but theorists in this area have worked to show that propositions express propositions at all.[32] I've begun to fill out what the nature of these propositions might be in the context of mental representation.

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[32]E.g., as mentioned, Grzankowski (2015).

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