Conceptual change and development on multiple time scales: From incremental evolution to origins

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Abstract. In the context of the relationship between signs and concepts, this paper tackles some of the ongoing controversies over conceptual development and change – including the claim by some that concepts are not open to revision at all – taking the position that concepts pull apart from language and that concepts can be discussed on at least four levels: that of individual agent, community, society, and language. More controversially, it claims that concepts are not just inherently open to revision but that they, and the frameworks of which they form part, are in a state of continuous, if generally incremental, change: a position that derives directly from the *enactive* tradition in philosophy. Concepts, to be effective as concepts, must strike a careful balance between being stable enough to apply across suitably many contexts and flexible enough to adapt to each new context. The paper's contribution is a comparison and contrast of conceptual development and change on four time scales: that of the day-to-day life of an individual conceptual agent, the day-to-day life of society, the lifetime of an individual agent, and the lifetime of society and the human species itself. It concludes that the relationship between concepts and experience (individual or collective) is one of circular and not linear causality.

Keywords: concepts, conceptual abilities, paradigm shift, radical re-conceptualization, circular causality, enactivism

1. Introduction

1.1. What are concepts?

Concepts are the framework underlying not just language but unspoken thought. They may roughly be taken equally either as units of structured thought or as the ability/-ies to possess and employ structured thought – I take the two formulations as equivalent[1]; such that such thought is[2] (a) systematic (the same concepts can be employed *systematically* across contexts); (b) productive (a finite number can be combined and recombined in unboundedly many ways); (c) compositional (concepts build on one another, forming complex concepts and, at least in the case of certain conceptual agents, propositions[3]); (d) intentional as *per* Brentano (concepts are always *about* something: they have a *content*[4]) for an identifiable agent (i.e. they are never free-floating); (e) re-identifiable (they take a particular form, which might be called their *expression*, that is distinct from their content), (f) 'spontaneous' *per* Kant's terminology [what Jesse Prinz (2004: 197) calls "being under the agent's *endogenous control*"][5]; and (g) *pace* Jerry Fodor (2008), subject to revision (if not, in fact, as I will argue, in a state of constant if incremental change). That final point will be the focus of this paper.

Alternatively, concepts can be characterized as the ability/-ies by which certain agents are able to respond flexibly to their environment so that, presented with the 'same' circumstances on different occasions, they can make different choices, based on an active consideration of their past experiences as well as anticipation of experiences to come. Critically, that flexibility depends *both* on being sufficiently stable to be relied upon and sufficiently dynamic to be able to adapt.

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[1]   That is, concepts are both things we possess and employ and *something that we do*. I leave aside for the present paper the endlessly debated question of whether concepts are representations or (non-representational) abilities except to suggest that, as I have argued elsewhere (Parthemore 2010, 2011a, 2013b), they are most properly understood as both: representations when we stop and reflect on them, (non-representational) abilities when we just get on with possessing and employing them non-reflectively.

[2]   For similar lists, see Prinz 2004, Ch. 1; Fodor 1998, Ch. 1; Chrisley, Parthemore 2007.

[3]   Note that propositions can be interpreted as beliefs: e.g. the proposition "it is raining" can be read as the implied propositional attitude "I believe that it is raining". The term "proposition" gets used in many, subtly different ways in the literature, some of which assume linguistic framing or expression and some of which do not. I am *not* assuming linguistic framing or expression, meaning that propositionally structured thought, as expressive of certain complex concepts, may be available to non-linguistic agents.

[4]   What they are about, what they refer to – their *content* – can be distinguished from what form they take in the mind of the agent possessing and employing them, allowing the agent to reidentify and reuse them appropriately. The latter is the equivalent of semiotic *expression*.

[5]   In other words, concepts are not simply given passively to the conceptual agent. The conceptual agent is not free to do with them as she pleases – the control is not absolute – but she can substantively shape and reshape them.

1.2. What are signs?

The working definition of concepts I have offered is consistent with the way many others have defined signs: e.g., Charles Sanders Peirce (who at some points takes signs so broadly as to include almost anything) writes (1998: 82–83):

> A sign is something which stands for another thing to a mind […]. On the first place, it must have characters which shall enable us to distinguish it from other objects. In the second place, it must be affected in some way by the object which it signified or at least something about it must vary as a consequence of a real causation with some variation of its object.

Göran Sonesson and his student Sara Lenninger offer a definition of sign (Sonesson, Lenninger *forthcoming*; see also Sonesson 2012, 2003) that is in its spirit very close to the one I am offering for conceptually structured thought, and so, for my purposes, more useful:

> Any sign must possess the following properties: it contains (at least) two parts (expression and content) and is as a whole relatively independent of that for which it stands (the referent); these parts are differentiated, from the point of view of the subjects involved in the semiotic process […]; there is a double asymmetry between the two parts, because one part, expression, is more directly experienced than the other; and because the other part, content, is more in focus than the other; the sign itself is subjectively differentiated from the referent, and the referent is more indirectly known than any part of the sign.

In a similar vein, Lenninger (2012: 1) writes that signs "imply relations between expression and content for an interpreting subject. That is to say that signs involve something that is 'given' to someone (the *expression*); and, further, that this 'given' meaning draws attention to something else: i.e., the *content*". The difference – as the quotations might be seen to imply – is that they could be understood as requiring the agent possessing and employing the sign to be *consciously aware* of doing so. That is, the differentiation between expression and content that my definition of concepts allows to remain implicit to the agent [potentially more *knowing how* than *knowing that,* to borrow Gilbert Ryle's (1949) famous distinction] becomes, for them, at least partially or at least potentially explicit.

For purposes of this paper, I prefer to understand concepts as essentially co-extensive with consciousness (I assume that most theories of consciousness at least implicitly assume that consciousness, to qualify as consciousness, should be conceptually structured, although I will not argue the point here) and interpret signs rather more narrowly as *per* Zlatev 2002, as conceptually mediated attempts at communication that are at least semi-conventionalized, of which language forms a subset. The

recipient could be another agent, or it could equally be oneself. On the other hand, sign use *does* assume a social context. As the paper will make clear, I take concepts to be prior to signs and sign use ontogenetically and phylogenetically, in this sense; while signs and sign use are likewise prior to language – with considerable inspiration from Jordan Zlatev's (2009) *semiotic hierarchy* of life ← consciousness ← signs ← language.

In the end, how narrowly or broadly one interprets signs does not matter for purposes of this paper. If, on a very broad reading of signs,[6] concepts and signs amount to more or less the same thing, then a discussion of the change and development of concepts on multiple time scales simply will be another way of looking at the change and development of signs on multiple time scales, using a slightly different toolset and vocabulary. If, on a narrower reading of signs such as I prefer, concepts are prior to and provide part of the necessary and, indeed, integral foundation to signs, then an understanding of the change and development of concepts should be expected to shed light on the change and development of signs, which concepts make possible. On this narrower reading, the development of sign use on multiple time scales may not be expected necessarily to recapitulate the corresponding development of concepts – not precisely – but there should be a close relation, just as a key ingredient in a recipe has much to say about the final product.

1.3. Concepts: further desiderata

1.3.1. Publicity

In offering my desiderata for concepts, I quite deliberately choose *not* to include publicity: the idea that concepts are intrinsically *public* entities. That is because, *pace* Fodor but in keeping with Prinz's (2004) *proxytypes theory,* wherein the 'publicity' constraint is relaxed,[7] and Gärdenfors' (2004) *conceptual spaces theory,* wherein concepts are implied to have both a 'public' and a 'private' nature, I believe it is possible to talk about 'the same' concepts on at least four levels:[8]

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[6]   Where a sign is an abstract entity that can take concrete expression. A road sign *conveys* a semiotic sign to the appropriately educated reader, but it is not, itself, a semiotic sign, merely its vehicle.

[7]   In arguing for relaxing the publicity constraint, Prinz (2004: 158) writes, "If you and I agree about the most conspicuous walrus features, then we understand each other when we use the word 'walrus', and we engage in similar walrus-directed behaviors". Note that, as the extended passage makes clear, Prinz clearly understands concepts to be (partly) comprised of beliefs.

[8]   Although it is common usage to talk about concepts both individually and collectively – all of the theories of concepts referenced in this paper take as their starting point that one *can* do so – nevertheless, some researchers have suggested (Woodfield 1994) or argued strongly (Machery 2009) that what one calls concepts in the two cases are quite different things and

(1) concepts for the individual, as shaped by personal experience;

(2) concepts for the group, as shaped by collective experience;

(3) concepts for the society, as shaped by collective experience on an even broader level;

(4) concepts as (optionally) embodied in signs or lexicalized into the words of a language.

What this means is that – in the language of conceptual spaces theory – all sign-using conceptual agents simultaneously occupy multiple conceptual spaces, which relate in complicated ways. If concepts change and develop – as I believe they do – then they do so on at least these levels.

1.3.2. Articulability

Likewise, though I have in earlier writings included it (Chrisley, Parthemore 2007), I did not include articulability: the idea that concepts are intrinsically communicable, which is usually taken to mean language, although conventionalized gesture could be included as well. As Colin Allen (1999: 39) writes, "The close connection of language to concepts in humans has seduced many into thinking that the two notions of language and concepts cannot be disentangled".

 The idea that concepts require language – which is generally taken to be an empirical rather than a stipulative claim – is common currency among philosophers of mind and language. I understand John McDowell (1996) as taking this line;[9] Zoltan Torey goes further in making thought in general (Torey 2009: 46) and, indeed, mind itself (Torey 2009: 123) dependent on language; and Davidson (1987) takes a similar line. Although the later Wilfrid Sellars may well have moderated his views,[10] the early Sellars (e.g. 1956) clearly took this position. Fodor does not explicitly endorse articulability in this sense, but he does tie language and concepts closely together, so that most simple concepts end up being lexical concepts; and his

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should go by different names. At least within philosophy of mind, I consider this to be, however, the minority position. For Fodor, who has a strong publicity requirement, individual and collective concepts are (and must be) precisely the same; while, for Prinz and Gärdenfors and myself, they need not be.

[9]   I say this both because of the way McDowell describes language as bridging the divide between 'mere animals' (who lack concepts) and humans (see e.g. McDowell 1996: 125 and all of Lecture 6). The articulability requirement itself is given in passing in Lecture 1 (McDowell 1996: 6). Note that McDowell is willing to attribute proto-concepts to some non-human agents, meaning, as I do, mental particulars that do not meet all of the conditions on being concepts.

[10]   de Vries, Willem 1987. Sellars, animals, and thought. Presentation to the Eastern Division of APA, December 1996: http://www.ditext.com/devries/sellanim.html (accessed 31 October 2013).

language of thought hypothesis (LOT; Fodor 2008, 1975) effectively makes structured thought into a language of its own.

I want to reject this received view for three reasons:

(1) With inspiration from Zlatev's semiotic hierarchy – although Zlatev does *not* endorse this view! – as well as the close relation on most accounts between concepts and consciousness, I want to make the theoretical argument that conceptually structured thought, in terms of all the desiderata listen in the opening paragraph, is logically prior to attempts at structured communication: either sign use or language.

(2) A growing weight of empirical evidence supports the view that pre-linguistic infants (see Section 2.3) and at least some non-linguistic species (see Section 2.4.2) clearly have conceptual abilities.[11] Such evidence aside, one wants to take care not to imply that, simply because we have no means of directly interrogating non-linguistic agents about their concepts, that they do not possess them.

(3) Separating concepts from communication makes it easier to tell a story of how conceptual abilities first appear, either ontogenetically or phylogenetically, and how our concepts and conceptual frameworks evolve, without requiring language from the beginning.

1.3.3. Change

One potentially controversial desideratum I *have* included is revisability/change. According to Fodor's (2008) *informational atomism* theory of concepts, concepts do not change – indeed *cannot,* given that they are individuated strictly by their mind-independent referent. A concept of 'gold' is a concept of 'gold' because – and only because – it refers to the metal gold. Although I have a very different understanding of gold than the ancient Greeks did – I know about the periodic table for starters – nevertheless, I have precisely the same concept because it refers to precisely the same thing. For Fodor, concepts are constitutive of beliefs, but beliefs are in no way constitutive of concepts.

Nevertheless, on most other accounts, and noting the questions raised by Andrew Woodfield (1994), concepts can and often *do* change, precisely because beliefs are (partly) constitutive of concepts, and not just the other way around. I have in mind in particular prototype theories (Rosch 1975, 1999) and their derivatives, including *proxytypes theory* and *conceptual spaces theory*, which assume that, since prototypes (appear to) change over time (or at least be open to such change), then concepts change as well. That said, I can think of no theory of concepts besides informational atomism that *denies* the possibility of conceptual change.

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[11]   I will use the phrase "conceptual abilities" wherever my emphasis is on concepts-as-abilities rather than concepts-as-abstract-objects (i.e., the 'building blocks' of structured thought).

However, I wish to make a much stronger claim, which I have articulated most completely in Parthemore 2013a: *the apparently static nature of concepts is an illusion; concepts are in a state of constant and – if often only incremental – movement and change.* They are in a constant state of – to borrow a turn of phrase from Humberto Maturana and Francisco Varela[12] – being *brought forth* as the conceptual agent interacts with her environment. Though their superficial appearance is of stability, their underlying nature is of fluidity. As I argue in Parthemore 2013a, they *must* be this way because, at the same time that they must be able to apply across unboundedly many contexts, to do so they must adapt to fit each new context – since each new context is, in one way or another, unlike any that came before. So there is a tension and a balance between stability and change. Too much stability, and concepts cease to be relevant, because they cannot adapt; the conceptual frameworks of which they form part cease to function as conceptual frameworks. Too much change, and the regularity that is their outward hallmark gets lost.

That principle – which lies at the heart of the *Unified Conceptual Space Theory* (Parthemore 2011a, 2013a, *forthcoming*; Parthemore, Morse 2010) – follows directly from that theory's distinctive position as an *enactive* theory of concepts and the way in turn that enactivism (Varela *et al.* 1991; Thompson 2007) gives a foundational role to interaction as a continuous process of adaptation and change, whereby both (experienced) agent and (experienced) environment are a product of that interaction and cannot be traced back beyond it. Enactivism, too, gives a foundational role to perspective and to shifts in perspective. Sometimes the agent's subjective experience is front and centre, with objective reality pushed into the background; other times objective reality is in the foreground, while the subjective and intersubjective element is pushed into the background or ignored altogether (but never entirely removed); *both* perspectives are necessary to get anything like a proper grasp on the interaction, which is foundational. Interaction being inherently dynamic – never precisely the same from one moment to the next – it follows logically that the products of that interaction must also be constantly, if often imperceptibly, changing. On an enactive perspective, concepts are, like cognition more broadly, intrinsically interactive. Their reification – when we stop and reflect on our concepts *as* concepts – belies their underlying process-based, continuously updating nature.

On this picture, concepts – like the agents who possess and employ them – have a kind of lifecycle. They are 'born' (there is, for example, a time on most accounts before a child has any concept of self or other or of object permanence); they develop into a kind of maturity whereby they achieve a relative stability (they

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[12]   "I have proposed the term *enactive* to… evoke the idea that what is known is brought forth, in contraposition to the more classical views of either cognitivism or connectionism" (Maturana, Varela 1992: 255).

generally change much less and more slowly in adulthood than in childhood: e.g., one develops a stable notion of oneself relative to one's social and physical surroundings); sometimes they cease to be useful and so 'die' (as a child, I had a much richer conceptual framework of "things lurking in my dark bedroom closet" than I do today[13]). In this paper, I talk about this conceptual lifecycle over the lifetime of both individuals and societies. Where one draws the lines – where one concept 'ends' and another 'begins' – is ultimately arbitrary. Unfortunately language confuses matters, because often people use the same word to express the 'old' concept as to express the 'new' one – as very nicely described by e.g. Thomas Kuhn (1990: 5) in comparing the pre- and post-Copernican content of the lexical concept 'planet'. What goes for 'planet' goes as well for such mundane concepts as 'cup' or 'chair'. My adult conceptualization of 'cup' both includes and excludes things that fell under *cup* for me as a child. Likewise consider my concept of 'cup' relative to that of, say, an ancient Roman, for whom a cup did not, presumably, include the possibility – never mind expectation – of a handle.

Given such a picture of concepts, it follows that understanding how they appear in the first place and how they change over time requires shifting focus between a number of different time scales. Think of a camera first zooming in then gradually zooming back out. In Section 2 I describe conceptual development on four time scales, roughly from the smallest to the largest. Since individuals generally have shorter lifespans than the groups of which they form a part, the shortest – and, at the same time, most highly paced – time scale will be that of the day-to-day life of individual conceptual agents. The paper concludes with general discussion.

2. Multiple time scales

2.1. Time scale I: The life cycle of concepts in everyday use for the individual

Concepts – all concepts – have a beginning. Concepts are, if I am correct, in a process of continuous if generally incremental change. Past a certain point, a concept may have changed so much as, effectively, to become a concept of *something else*; or it may get mentally filed away as a historical relic, no longer actively a part of our conceptual frameworks.

Although, over the course of our lifetimes, we are in a continuous process of gaining new concepts and discarding old ones that are no longer useful (the personal equivalent of 'phlogiston' or 'caloric'[14]), nevertheless, on a day-to-day basis, most of

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[13]   I offer further examples on the life cycle of concepts in the sections that follow.

[14]   Of course, these concepts still exist – or rather, the labels still do, and we have a fairly good idea of what people meant or thought they meant by them. But concepts of 'phlogiston' and

our concepts seem to be remarkably stable, even static – indeed, even necessarily so. What good is a concept of, say, 'dog' if it points to one thing one day and another thing the next? Nevertheless, the seeming fixedness of concepts, once we acquire them, is arguably but a product of two things: the relatively slow rate of change of most concepts, most of the time; and our lack of attention to that change. One might usefully draw a comparison here with the phenomenon of *change blindness,* where – in one version of the phenomenon – change that is sufficiently slow and continuous fails to grasp our attention.[15] Consider e.g. a shirt that changes from red to blue over the course of many minutes. In both instances, incremental change fails to register as change at all – even when the cumulative effect is quite dramatic. Only when one is confronted with that cumulative change (a 'before' and 'after' picture as it were) is it suddenly blatantly clear.

As I describe in Parthemore, Morse 2010, the causal relationship between concepts and experience, for the individual conceptual agent, is not linear but circular. Experience gives rise to concepts, which, in turn, structure experience: neither is primary. Although something must logically start off the process – i.e., somewhere there is a linear story to be told – once it is underway, it is impossible for the conceptual agent to step outside the circle, to see things 'as they really are'. Putting this another way, concepts do not exist in isolation but only as parts of a larger conceptual framework. When new concepts are 'born', they arise within an existing conceptual framework that surrounds and supports them; when they 'die', it is to that framework they return (i.e., many of the concepts that made possible their emergence remain even after they themselves are gone).[16]

Consider the concept 'tesseract'. I was introduced to it by my Third Grade teacher, who read Madeleine L'Engle's *A Wrinkle in Time* (2012[1962]) aloud to the class. I understood that it somehow meant a 'four-dimensional' cube with an 'extra' dimension beyond length, width, and height, at right angles to each of the first three – the final right angle being one I could imagine but not perceive. I understood this, in part, because I had a basic grasp of geometry: of 'regular' plane figures
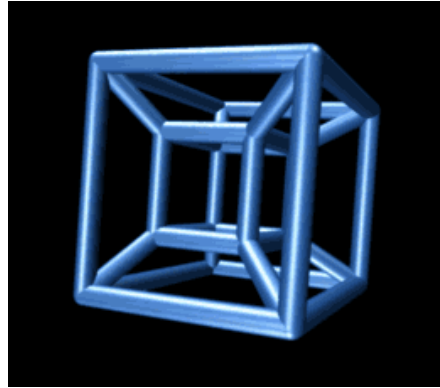

'caloric' no longer form an active part of most people's conceptual frameworks, unless they are studying history of science.

[15]   For a good review of both the associated phenomena and contemporary ways of accounting for them, see Noë 2007.

[16]   Once again, Fodor (2008: 54) takes a different view, at least when it comes to lexical concepts: "It's plausible prima facie that "a" might refer to *a* even if there are *no* other symbols. The whole truth about a language might be that its only well-formed expression is "John" and that "John" refers to *John*. I do think that uncorrupted intuition supports this sort of view; the fact that "John" refers to *John* doesn't seem to depend on… such facts as that "dog" refers to *dogs*". Note that for Fodor, rather like Allen Newell and Herbert Simon's *physical symbol system hypothesis* (Newell 1980), concepts are physical symbols in the brain.

and 'perfect' solids, of points and lines and dimensions, of right angles, and so on.

It was not until some time in high school that I understood in what way a tesseract is to a cube as a cube is to a square: namely, that just as a cube has six faces, all of which are squares, a tesseract has eight 'hyperfaces', all of which are cubes. As viewed in three or (even more so) two dimensions, the cubes look greatly distorted (see Figure 1); but they are all, in fact, identical.

On a day-to-day basis, my 'tesseract' concept does not change noticeably at all, most of the time. (Once in a while it does, though, as when I learned to relate tesser-acts to hyperspheres.) At the same time, each time I employ the concept, it must adapt at least a little to fit the circumstances: say, if I need to explain it to a ten-year-old (as I have done) or build myself a 3D model of its 'shadow' out of toothpicks and gumdrops (as I have also done) or decide to list all its properties that I know about (prompting me to discover new ones).

At some point, some clever mathematician may convince me that, in fact, tesser-acts are not theoretically possible after all; or may teach me so much about them that my 'tesseract' concept becomes a concept of… something else, at which point the original concept is obsolete, even if the new concept hangs by the same lexical label.

Figure 1. Projection of a tesseract into two dimensions. Downloaded from Wikimedia Commons (http://commons.wikimedia.org) and reproduced under the Creative Commons license.

2.2. Time scale II: The life cycle of concepts in everyday use for society

Societies usefully can be, and often are, described as having lifespans of their own: so e.g. one talks of the 'birth' of the Roman republic or the 'fall' of Rome. Just as, over the course of human lifetimes, individual conceptual agents are in a continuous process of gaining new concepts and discarding old ones; so, over the course of their own lifetimes, societies are engaged in an analogous process of creation and destruction.

If the 'tesseract' concept was 'born' for me in Third Grade, that was possible only because it already existed for the society of which I was and am a part, having filtered its way down from abstract mathematics to children's literature. Although it is hard to ascertain just how old the concept is – if that question even makes sense given the discussion above – its 'invention' or 'discovery' is usually attributed to Ludwig Schläfli, working in the mid-19th century, who proved that there are six such 'perfect' hypersolids, corresponding to the five 'perfect' solids of three

dimensions – tetrahedron, cube, octahedron, dodecahedron, and icosahedron – of which all but the dodecahedron were known by the ancient Greeks. Its lexicalization is attributed to Charles Howard Hinton (1888). In general, the life cycle of the societal concept of 'tesseract' is stretched out relative to its lifecycle at the level of me or any other individual, given the way that various mathematicians, acting as part of a mathematical community, have added at one time or another to our shared understanding of it.

What is, at the level of individual agents, couched in the language of psychology in terms of *belief revision* is, at the societal level, often couched in the language of philosophy in terms of the so-called *history of ideas.* There have been recent attempts to bring the two discussions together: notably Olsson, Enqvist 2010. Erik Olsson and Sebastian Enqvist write in the introduction in the introduction:

> Belief revision theory and philosophy of science both aspire to shed light on the dynamics of knowledge – on how our view of the world changes (typically) in the light of new evidence. Yet these two areas of research have long seemed strangely detached from each other, as witnessed by the small number of cross-references and researchers working in both domains […]. One factor may be that while belief revision theory has traditionally been pursued in a bottom-up manner, focusing on the endeavors of single inquirers, philosophers of science, inspired by logical empiricism, have tended to be more interested in science as a multi-agent or agent-independent phenomenon. (Olsson, Enqvist 2010: v)

Once again, enactivism, with its insistence on a flexible and *negotiable* boundary between self and other or self and society (or self and world)[17] – as a useful, even necessary, conceptual distinction but with no commitment to any prior ontological one (Parthemore 2011b) – suggests that both perspectives (individual and collective – but also bottom up and top down) are needed for anything like a complete picture. The individual's lifespan takes place in the context of the lifespan of the society of which she forms a part; meanwhile, the lifespan of the society is only meaningful relative to the lifespan of its many individual members.

2.3. Time scale III: Over the lifetime of the individual

Once one steps back from the typical day-to-day life of an individual to consider her lifespan, two additional aspects of conceptual change come to the fore: how the individual's conceptual frameworks get started in the first place – assuming that she is

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[17]   Although Andy Clark is not considered an enactive philosopher, his and David Chalmers' *Extended Mind Hypothesis* has, in many ways, a similar inspiration. Clark writes of "profoundly embodied agents" (2008: 34) such that "such agents are able constantly to negotiate and renegotiate the agent-world boundary itself".

not born with them – and what happens when not just individual concepts become obsolete but entire conceptual frameworks break down.

A caveat is in order, particularly with regard to conceptual genesis, given the earlier claim that no conceptual agent can set aside her conceptual nature, even for a moment, to see her (or anyone else's) concepts 'as they really are'; no conceptual agent can step outside the circular causal loop that is concepts and experience. Therefore, any account one offers of the origins of the very first conceptual frameworks one possesses must have something of the 'just so' story about it; the most one can say of the story is that it is logically plausible and that it fits the available evidence, though it almost certainly over-intellectualizes matters and otherwise distorts things through an inevitably conceptually biased perspective, because researchers are unavoidably conceptual agents. Nevertheless, it provides a place to start.

2.3.1. Not innate concepts, but innate protoconcepts

One need not go so far as a Fodor-inspired nativism to think that some concepts, at least, are with us from the very start of life[18]; so e.g. Stevan Harnad writes (1990: 2): "clearly, no organism is born a blank slate. Some categories are innate" – a position that such researchers in early childhood development as Colwyn Trevarthen (e.g. Trevarthen 2012) are clearly inclined toward as well. On such a view, nothing is required to get the conceptual framework building going, because the initial conceptual framework is already there.

As I argued previously in Parthemore 2013a, I wish to take a different approach: one that presupposes an initial framework (or, if you will, mechanism), but not a properly *conceptual* one. The idea is that conceptual frameworks depend on certain innate[19] *proto*-concepts (or, if you will, protoconceptual abilities) to get going, along with certain 'rules' about how they may join together or be pulled apart. These then delimit the structure of all the conceptual frameworks that follow, biasing conceptual agents to look at the world in certain ways and not in others. UCST suggests these are three:

(1) proto-object: a *something*; or: the ability to recognize a *something* as a *something*, roughly corresponding to the English language category of 'noun';

(2) proto-action/event: a *happening*; or: the ability to recognize a *happening* as a *happening,* roughly corresponding to the English language category of 'verb';

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[18]   Fodor is widely understood as a *radical nativist*, for whom many if not most of our concepts are innate. That said, what exactly he means by that nativism is far from straightforwardly clear (see e.g. Prinz 2004: 230) and seems to have evolved over the years as well (Fodor 1975, 2008).

[19]   I mean 'innate' roughly in the sense of 'with us from birth' and leave aside for now the question of whether this innateness is genetic or gestational or something else again.

(3) proto-property: a '_____ *is like this*'; or: the ability to recognize a '_____ *is like this*' as a '_____ *is like this*', roughly corresponding to the English language categories of 'adjective' and 'adverb'.

Putting this another way, agents who are or have the capacity to become conceptual agents are 'pre-configured' to see the world in terms of (abstract or concrete) objects, actions or events involving those objects,[20] and properties that these objects, actions, and events possess. Every human language can express these ideas, regardless of whether or not it has the corresponding grammatical categories to noun, verb, and adjective/adverb; and, with a little care, all ideas can be traced back to one of these three categories. If it seems that one *must* view the world in this way, it need not be because of any prior ontological structure in the world but only because, the proto-conceptual structure being innate and therefore presupposed, it cannot be questioned, let alone set aside.

Such entities are not concepts proper because they fail to meet all the desiderata offered in the opening of the paper. In particular, being innate, they are not under the agent's endogenous control, nor are they subject to revision; and they are too few in number to be, of themselves, productive.

The proposal is that, given the appropriate environment and the appropriate interactions with that environment, these protoconcepts give rise to the most richly structured of conceptual frameworks. To do so, something else is required: what I have loosely referred to above as 'rules'. By this I mean another set of entities, which are neither proto-conceptual nor conceptual but rather connect (or 'glue') protoconcepts and, later, concepts together, describing how they relate. These *connectors* provide the innate foundations for the comparable relations in informal language and formal logic, which at the same time they need to be distinguished from, lacking the conceptual baggage and the linguistic and logic-based commitments attached to the latter. They should initially consist of a version of 'and' (parts go together to make a [new] whole, where order does not matter), 'then' (parts go together to make a [new] whole, where order *does* matter), 'xor' (what previously appeared as a uniform whole is divided into distinct parts, or one faces a choice point between two mutually exclusive paths),[21] and 'equals' (what previously were taken to be two distinct entities or mutually exclusive paths are made or shown to be the same entity/path).

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[20] 'Actions' I mean in the conventional sense of being "intentional under some description" (Davidson 1980: 50) (i.e., by an agent), as opposed to other sorts of events, which are 'mere happenings': a tree branch snaps, a volcano erupts; one does not assume that either the tree or the volcano in any way chose to do these things. Davidson is the standard reference here, and I defer to his notion of agency.
[21] 'Ior' can be derived by combining 'xor' with 'and'.

Protoconcepts and connectors join together to define, in UCST, an emergent and divergent *space of spaces*: a unified space bringing together all the many conceptual spaces (colour conceptual space, tone conceptual space, etc.) that any given conceptual agent possesses, where each subspace constitutes a particular conceptual domain, defined by a set of integral dimensions (e.g., 'colour' has the integral dimensions of 'hue', 'saturation', and 'brightness', 'tone' the integral dimensions of 'volume' and 'pitch') and a pre-determined metric.[22] That is to say, protoconcepts and proto-connectors together constitute both a defining algorithm and simultaneously a geometry for the unified space. The unified space is the conceptual agent's primary conceptual framework: the foundational domain to all the conceptual domains with which she is conversant.[23]

If one takes this 'just so'-like story as a starting point, the question remains how exactly one gets from starting point to 'final' product: from proto-concepts to fully fledged concepts via (according to UCST; see especially Parthemore 2014) a succession of sensorimotor engagements. Phrased another way, the question becomes, 'how can we *generalize* from single observations to general laws?' (Gärdenfors 2004: 205) or, more broadly, from individual sensorimotor experiences to (necessarily general) concepts. The process is – so Gärdenfors implies – largely driven by induction.

One might describe it more precisely as an iterated process of pattern recognition/extraction/imposition (my inspiration here is Dennett 1991) driven by some initially minimal notion of salience grounded, probably, in the survival of the organism.[24] Through repeated iterations, the agent moves from patterns to patterns of patterns to patterns of patterns of patterns, and from the sensorimotorly concrete to the increasingly abstract. With each iteration, the agent steps further back from the present moment, and the moment itself – i.e., the minimally individuable unit of time – becomes both increasingly discretized and elongated. In the language of conceptual spaces theory or UCST, it is the progressive partitioning and re-partitioning of an initially minimally partitioned conceptual space.

Partly for the reasons given at the start of this section, research on innate and early-childhood conceptual mechanisms remains at best preliminary and highly controversial. The general consensus in the child development literature is that the self/

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[22]   Pre-determined by the agent based on its salience needs: i.e., what level of detail is useful. Without going into further detail, note that the metric might reasonably be discrete or continuous. Note that Gärdenfors (personal communication) acknowledges that the notion of a unified space of spaces is implicit in conceptual spaces theory but has not yet come to a preferred description of it for himself.
[23]   For details on UCST, see Parthemore 2010, 2011, 2013. The algorithm is specified most fully in Parthemore *forthcoming*.
[24]   See e.g. Thompson, Stapleton 2009, though the idea of grounding salience in survival of the organism is common currency in the enactive community.

other (or self/non-self or self/world) distinction – I take the three to be more or less equivalent – is both one of the very first conceptual distinctions children make and one of the most foundational to all that follow, even as it continues to evolve. Other concepts, such as object permanence, likewise come quite early: Jean Piaget (1954) famously located it at nine months; Renée Baillargeon (1987) has claimed evidence for it at less than half that age. Children have a well-documented tendency to over-generalize (probably by under-specification):[25] e.g., to apply 'dog' to non-dogs; over time though, they increasingly bring their own developing conceptual frameworks into alignment with the societies of which they are part. I take it as consistent with the child development literature that:

- children possess concepts before they are able to express them;
- children are able to express concepts through gesture before they can do so through language;
- children are able to express concepts appropriately through language before they are able to reflect on *them* rather than their objects.

2.3.2. Radical re-conceptualization

At the other end of life, one not infrequently finds what appears to be the wholesale disintegration of conceptual frameworks in advanced cases of dementia, when cognitive abilities in general are breaking down. Of more interest for present purposes are those occasions at various points in one's life where, in not quite such a wholesale but still substantive fashion, conceptual frameworks break down – and get replaced by something new, a process I have elsewhere (Parthemore 2013b) called *radical re-conceptualization* as the individual-agent-level version of what Kuhn (1970, 1990) called *paradigm shifts*: the wholesale replacement of one conceptual framework by another.[26]

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[25]   See the discussion in Gärdenfors 2004: 125.

[26]   Without recapitulating the argument from the earlier paper, suffice to say here that I do not take the two processes of conceptual change – for the (scientific) community and for the individual – to be merely analogous (as one of my anonymous reviewers understood it, and as some would have it: e.g., Greiffenhagen, Sherman 2006) but, indeed, one and the same process. This is in general keeping with my position that concepts can be described on multiple levels: for the individual, for the community, and for the society. Note that Greiffenhagen and Sherman – who consider the "analogy" to be a false one – are talking specifically about the application of Kuhn's paradigm shifts to understanding the teaching of science in the school classroom. Their concerns are ultimately specific to that context and so do not, I believe, apply here. Note that I am *not* interested here in everything that Kuhn has to say about paradigm shifts – much of it is irrelevant to my purposes – only that part that relates to conceptual change and replacement of conceptual frameworks.

Concepts allow us to interact with the world in a wholly different way than agents without concepts, even as they remove us from life "fully in the moment". They simplify the world in order to make it approachable:

> The prime problem is that the information received by the receptors is too rich and too unstructured. What is needed is some way of transforming and organizing the input into a mode that can be handled on the conceptual or symbolic level. This basically involves finding a more *economic* form of representation […]. (Gärdenfors 2004: 221).

At the same time, what Gärdenfors (2004: 221) goes on to call "a *reduction in the number of dimensions* that are represented" is not just a loss of potential information but of alternate understandings. That is because, even as concepts simplify, they increasingly bind us into one way of looking at the world: conceptual development constitutes a series of choice points to go down one path and not another. Each choice constrains subsequent choices – a propagation of constraints narrowing one in on a particular and precise view on the world to the exclusion of all others. Alternate views become impossible because previous choice points have ruled them out. Conceptual frameworks, were they never challenged – if there were not some mechanism to sweep away some of the structure periodically – would eventually grind to a halt, the conceptual equivalent of painting oneself into a corner.

In practice, conceptual frameworks get challenged in lesser or greater ways, the greater ways tending toward what I have called radical re-conceptualization. As Etzel Cardeña (2011) suggests, conceptual frameworks can be replaced temporarily through certain altered states of consciousness; it can happen more permanently through such "life changing" events as mid-life crises and religious experiences, where a period of initial confusion, as long-held assumptions get discarded, is followed by one of creative conceptual growth.

Per Lind (2013) writes how the Greek Pyrrhonists, with their emphatic rejection of dogmatism or any other rigid way of thinking, deliberately set up cognitive conflicts for themselves and sought out contradictions in themselves so as to induce this kind of breakdown over and over again *ad infinitum*. Of course, it is never possible, never mind desirable, to throw *everything* out and start over; the trick is knowing what to discard and what to keep.[27] This capacity for renewal and re-invention is what we celebrate, I think, when e.g. an 85-year-old man takes up body building[28] or

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[27]   Needless to say, I speak metaphorically here. Radical reconceptualization should not be taken, most of the time, as a consciously deliberative process: to the contrary. Unlike the Pyrrhonists, who deliberately set out to sabotage their own conceptual frameworks, for most people most radical breakdowns in and restructurings of conceptual frameworks are probably *not* planned for.

[28]   http://www.theguardian.com/lifeandstyle/2011/apr/02/i-am-a-90-year-old-bodybuilder.

when a man approaching his 98th birthday skydives for the first time in his life only to say "it was the first time but it won't be the last".[29]

2.4. Time scale IV: Over the lifetime of a society and the species

In the context of any given society, one cannot really talk about the origins of concepts in general or of conceptual frameworks. Every society, it seems, inherits these from the societies that came before – except, of course, that some society (or proto-society?) logically had to have come first. One can, on the other hand, talk about the societal equivalent of radical re-conceptualization: Kuhn's *paradigm shifts.* Given the comparative time scales, I will discuss these first and conceptual origins last.

2.4.1. Paradigm shifts in the society and the species

Once again, I set aside the possibility of conceptual collapse – the stuff of science fiction – whereby one or another society or the entire human species abandons its conceptual commitments altogether and 'reverts' to the status of 'wild beasts', like the Sleestak of a certain science fiction television series. Such possibilities exist, for now, only in the realm of speculation; whereas the (partial) collapse and replacement of conceptual frameworks at the societal level – the societal equivalent, if you will, of sudden eureka-style revelation or mid-life crisis – is very well documented (see below).

As said, I relate radical re-conceptualization to Kuhn's notion of paradigm shift, which was aimed, in the first instance, not at society in general but at the scientific community, even though Kuhn would readily allow, I think, that there is no sharp dividing line between the two, and that what starts as a paradigm shift for the scientific community filters out over time (and with some distortions) to the wider society. Kuhn is keen to stress, at least in his later work (e.g. Kuhn 1990), that the incommensurability between old and new can never be complete incommensurability; indeed, anything even remotely close to 'complete' incommensurability would prevent any comparisons whatsoever of old to new – and any confusions. Confusions arise precisely because the incommensurability is partial – because there *is* overlap between old and new – because some of the new concepts go by old names, and some of the concepts that carry over from old to new are radically changed. As Kuhn (1990: 4) writes, "*pace* the causal theorists of reference,[30] 'water' did not always refer to H_2O". He continues:

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[29]   http://news.bbc.co.uk/2/hi/uk_news/england/7983045.stm.
[30]   This includes Fodor, of course.

> […] I've elsewhere pointed out […] that the content of the Copernican statement, 'planets travel around the sun', cannot be expressed in a statement that invokes the celestial taxonomy of the Ptolemaic statement, 'planets travel around the earth'. The difference between the two statements is not simply one of fact. The term 'planet' appears as a kind term in both, and the two kinds overlap in membership without either's containing all the celestial bodies contained in the other. (Kuhn 1990: 5)[31]

In similar fashion, Hanne Andersen and Nancy J. Nersessian (2000: S239) note, in analysing the paradigm shift from Maxwell's to Einstein's electrodynamics, "despite major conceptual change, there is still significant continuity between the Maxwellian and the Einsteinian concepts of field". So, the radical change of a paradigm shift, like that of radical re-conceptualization, is complementary to and continuous with more incremental change.

Not infrequently, paradigm shifts for one or another society become paradigm shifts for the species. Certainly that would seem to be the case in the contemporary world, with its realization – with technical achievements well beyond anything he lived to see – of what Marshall McLuhan (1962) termed the *global village*, where near-simultaneous communications make possible a society of societies: a single common society of which all human societies and all human beings are a part.

As the Pyrrhonists would surely agree, the result of successive paradigm shifts might, but need not, move either society or species closer to 'truth' in any absolute, atemporal sense. Conceptual frameworks, like scientific hypotheses, may even be assumed to be wrong in that sense, based on the limitations of human cognition and perspective – a position in philosophy of science with which Albert Einstein is strongly associated (see e.g. Stachel 1982: 96), and which is in keeping as well with the enactive perspective, with its inclination to see 'truth' as a moving target, ultimately and intimately bound up with its historical and cultural context.

Some of the best research on societal paradigm shifts comes from cultural and social anthropology. Consider the work of Napoleon Chagnon among the Yanomamö of Brazil (Chagnon 1968[1966]), for whom Chagnon was, at the time of his initial contact, the first 'white' man the Yanomamö tribes he contacted had ever seen. In the space of a few decades, their world has changed for them almost beyond recognition.

Some of the best research, arguably, was done in the late Colonial period, as the British Empire was beginning to collapse, and a generation of anthropologists examined the often dramatic and not infrequently tragic effects that colonialism had had: e.g., E. E. Evans-Pritchard's work among the Azande (1937) or Mary Douglas'

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[31]   Note how, in addition to the main point Kuhn is making, this can be taken to highlight the distinction I made earlier between the shared concepts of a society and the words by which they become lexicalized.

among the Lele of the Kasai (1963). Also worth noting is Douglas' (1966) reporting on the millennial *cargo cults* of Melanesia, with their peculiar juxtaposition of a call for a return to traditional values and a prediction of massive wealth in the form of Western consumer goods to be divinely bestowed on them.

2.4.2. Conceptual origins in the species

Such classic anthropology studies, though often controversial – not least Chagnon's – mean that society-wide paradigm shifts are, in many cases, well documented. The same cannot be said of the origins of the first concepts and conceptual frameworks. As with the individual, only much more so, the story one may tell, though empirically informed where possible, will, despite all the protestations of someone like William Thomas Polger (2007), necessarily bear all the hallmarks of the 'just so' story. After all, the human species has not been around long enough to observe the origin of concepts/conceptual abilities in other species, nor does anyone have a time machine with which to confront our own conceptual origins first hand.

Here, the guiding principle might best be that ontogeny need not recapitulate phylogeny: what the individual need not re-invent it generally does not. This implies that the origin of concepts in the species represents a much bigger cognitive leap than for the individual, who is born into the embrace of her society's conceptual frameworks.

If one takes the four stages of Merlin Donald's (1993, 2001) model of *cognitive-cultural evolution* – episodic (episode-driven), mimetic (gesture-driven), mythic (oral-language-driven), and theoretic (written-language-driven) – as a starting point, as I am inclined to do, then, it seems, the requirements of even the first of the four stages, which Donald sees us as sharing with the higher primates, already well exceed the requirements for conceptually structured thought laid out in the introduction. After all, episodic cognition, with its capacity to tie objects and events together into complex structures comprising concrete episodes, presupposes that one *has* concepts for those objects and events in the first place. It has the strikingly dual nature of being both specific to a particular spatiotemporal context and affording new ways of generalizing by relating the objects and actions that make up that context in flexible ways that agents without episodic cognition are unable to do. It is the difference between seeing a tree as a tree and seeing a tree as a tree in the wider context of agents and actions involving that tree on a given occasion: e.g., climbing a tree to avoid a predator that has suddenly appeared from the undergrowth.

> Episodic memory is, as the name implies, memory for specific episodes in life, that is, events with a specific time-space locus. Thus, we can remember the specifics of an experience: the place, the weather, the colors and smells, the voices of the past […]. Such memories are rich in specific perceptual content. By definition, episodes are bound in time and space to specific dates and places. (Donald 1993: 150)

The requirements for conceptual cognition, as I have laid them out, are rather more modest: systematicity, productivity, compositionality, Kantian spontaneity, and revisability. Behaviourally, these translate into evidence of an ability to derive general classes from specific perceptual instances, apply these classes to novel situations in a flexible manner suggestive of some at least implicit reflective capacity, and express surprise when the consequent expectations go wrong (Newen, Bartels 2007: 291; Allen 1999: 37): none of which, on the face of it, require episodic cognition, let alone human-style language. If all this is right, then one should expect to find evidence of conceptually structured thought in a variety of non-human species – and indeed, as an accumulating body of evidence in the field of comparative cognition is driving home, one does.

Albert Newen and Andreas Bartels (2007) cite the parrot Alex (Pepperberg 1999) and the bonobo Kanzi (Savage-Rumbaugh *et al.* 1998). If one complains that these are case studies rather than controlled experiments, or that they involve linguistically enculturated agents who have developed some limited capacity for human language, then one can turn to the studies of scrub jays (Clayton, Dickinson 1998; Raby *et al.* 2007) and ravens (Bugnyar, Kotrschal 2002) who, through a series of carefully controlled experiments, show sophisticated flexibility in their caching habits. Ravens, furthermore, show sensitivity to the perspectives of others, including agents not of their species (Bugnyar 2011) and can seemingly adapt their behaviour to social context (Bugnyar, Heinrich 2006). Meanwhile, Santino, a chimp at Furuvik Zoo north of Stockholm, has, over the past ten years, shown an increasingly sophisticated pattern of projectile caching and throwing behaviour temporally removed from each other (Osvath 2009, 2010), culminating most recently in a pattern of hiding the projectiles under piles of hay and behind logs *from the viewpoint of the zoo visitors who are the intended targets* (Osvath, Karvonen 2012).

Although all of this is circumstantial evidence at best, nevertheless it does suggest that conceptual abilities are very possibly significantly older in the human lineage than the human species itself. Such removal in time makes speculation about their origins all the more speculative. Nevertheless, Gärdenfors and Osvath (2010) provide what might prove to be a useful pointer in the right direction, in suggesting the origins of *anticipatory cognition* – which exceeds the requirements of episodic cognition – in the Oldowan culture of 1.5–2.6 million years ago, driven by selective pressures in their ecological niche: in particular, the replacement of rain forest by savannah in relation to the then-developing ice age, forcing the Oldowan culture to move from a vegetarian to an omnivorous diet and collect their food from a much wider range of sources over a much wider area in a way that required advance planning and group coordination.

4. Summary and discussion

Taking what I take to be a standard approach to the properties of concepts, bar any requirement for articulability, this paper has understood concepts as prior to signs (on a narrow reading of signs), themselves prior to (human-style) language. This is not a thousand miles away from Zlatev's notion of a *semiotic hierarchy*. It has argued, *pace* Fodor but *per* the enactive perspective, that concepts are not only subject to change but in a state of continuous if often only incremental and easily ignorable motion. It has compared and contrasted conceptual change on four different time scales, from the day-to-day life of an individual conceptual agent at one end to the lifetime of a society and the species at the other. It has argued that certain limitations on human cognition prevent us from offering a definitive account of the origin of concepts and conceptual frameworks in childhood, while an account of their origins in the species is several orders more speculative. Nevertheless, by comparing the conceptual abilities of human beings to other species, we can hope to gain some insights into when and how those origins might have occurred and what the first conceptual frameworks might have looked like. As Donald (1998: 185) writes, "Humans are undoubtedly unique in their spontaneous invention of language and symbols; but, as I have argued elsewhere […] our special advantage is more on the production side than on the conceptual side of the ledger. Animals know much more than they can express".[32]

The consequences for understanding signs on either a broad or narrow reading are clear. On a very broad reading, the change and development of concepts *just is* the change and development of signs, cast in a slightly different light. On a narrower reading, such as I prefer, the change and development of concepts, as prior to and integral to the foundation of signs, can be expected significantly to inform the process of sign development, offering important clues to the semioticians.

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Изменение и развитие концептов на разных временных шкалах: от постепенной эволюции до происхождения

В контексте отношений между знаками и понятиями данная статья рассматривает некоторые противоречия в вопросах развития и изменения понятий. Автор исходит из того, что понятия возникают в языке и что их можно рассматривать как минимум на четырех уровнях: уровень отдельного агента, сообщества, общества и языка. В соответствии с энактивной философской традициией утверждается, что понятия не только открыты для изменения уже по своей сущности, но что вместе с окружающими их контекстами они находятся в состоянии постоянного, хотя и медленного изменения. Чтобы понятия эффективно работали в качестве понятий нужно, чтобы они были, с одной стороны, стабильными, а с другой – достаточно гибкими для приспобления к новым контекстам. В статье сравниваются и сопоставляются развитие и изменение понятий на четырех разных временных шкалах: в обыденной жизни концептуального агента, в жизни общества, в течении всей жизни отдельного агента и в течении эволюции человека как вида. Основной вывод статьи гласит, что связь между понятиями и индивидуальным или коллективным опытом основывается на линеарной, а не на циркулярной каузальности.

Mõistete muutumine ja areng mitmetel ajaskaaladel: järk-järgulisest evolutsioonist päritoluni

Märkide ja mõistete vahelise suhte kontekstis tegeldakse käesolevas artiklis mõnede kestvate vastuoludega mõistete arengu ja muutuse vallas – kaasa arvatud väited, et mõned mõisted ei allugi korrigeerimisele. Lähtutakse seisukohast, et mõisted tulenevad keelest ja et neid on võimalik käsitleda vähemalt neljal tasandil: üksiktegutseja, kogukonna, ühiskonna ja keele tasandil. Vastuokslikumalt väidetakse ka, et mõisted pole üksnes olemuslikult avatud

korrigeerimisele, vaid et koos raamistikega, millesse need kuuluvad, on need pideva, ehkki vähehaaval aset leidva, muutuse seisundis: seisukoht, mis tuleneb otseselt enaktiivsest traditsioonist filosoofias. Et mõisted oleksid mõistetena tõhusad, tuleb neis saavutada hoolikas tasakaal, et need oleksid piisavalt stabiilsed, olemaks rakendatavad sobivalt paljudes kontekstides, ja teisalt piisavalt paindlikud, et kohaneda iga uue kontekstiga. Selle artikli panus seisneb mõistete arengu ja muutuse võrdlemises ja vastandamises neljal ajaskaalal: kontseptuaalse üksiktoimija igapäevaelus, ühiskonna igapäevaelus, üksiktoimija elu vältel ja ühiskonna ning inimeste kui liigi elu vältel. Jõutakse järeldusele, et mõistete ja (individuaalse või kollektiivse) kogemuse vahelises sidemes valitseb lineaarne ja mitte tsirkulaarne kausaalsus.